Supplementary information

The Earth4All scenarios: Human wellbeing on a finite planet towards 2100

In this supplementary information to the paper *The Earth4All scenarios: Human wellbeing on a finite planet towards 2100* (Per Espen Stoknes, David Collste, Beniamino Callegari, Sarah E. Cornell, Owen Gaffney, Jorgen Randers, Nathalie Spittler), we present the use of behavioural fit as guides in the model building process, we suggest potential roads ahead for model edits and we present model equations and parameter values for the two scenarios in the Earth4All model.

1. Theoretical background and high-level model description.

The perspective of the Earth4All global model is similar to the World3 model (D. L. Meadows et al., 1974) of the *Limits to Growth* book (D. H. Meadows et al., 1972), but with significant modifications in economic modules to more clearly distinguish between growth in footprint (including land use and energy) and economic growth (GDP). Planetary boundaries (global warming, land use and fertilizer uses) are modeled in the form of rising costs for obtaining the same physical flow in resources or pollution absorption. The harder the pressures against boundaries, the more physical labor and physical capacity (capital) must be used to maintain flows without degrading the environment. This means shifting labor and capital from conventional activity into more sustainable activity. Such a shift does not reduce the number of jobs, but shifts jobs from providing conventional goods and services to providing a better environment. By shifting labor and capital in the model, humanity gets slightly fewer goods and services (measured in physical units per year) in exchange for a more sustainable world. The Earth4All model hence explores growth in the human footprint on a finite planet where it is possible to reduce the negative effect of boundaries' transgression on production through the use of more labor and capital. In other words, the possibility exists to achieve a more sustainable world in exchange for a reduction in the physical output of goods and services.

In conventional macroeconomic language, "running into limits" in the model leads to (slightly) lower rates of growth in real GDP matching the (slightly) lower growth in output of goods and services (measured in physical units) compared to a situation without limits. Running into limits leads to a (slight) reduction in real labor productivity because labor and capital is shifted into sectors with (slightly) higher costs. In the E4A model this slowing is represented as a (slight) slowing of the rate of growth in total factor productivity (TFP).

Below follows a summary of the model's modules. Note, however, that the modules have all been constructed given the overarching aim of representing the most important determinants of human well-being. Therefore, much module detail has been sacrificed for giving an overall image of the structure and behaviour of the world the model represents.

Population module. The population module considers four age cohorts (0-19, 20-39, 40-59 and 60+) with fertility and mortality endogenously calculated based on a lagged function of GDP per person (based on the assumption that fertility rates depend on access to healthcare and education which are strongly correlated with GDP per person). The prevalence of global warming causes increased mortality. In order for the model to reproduce SSP2 scenarios, a life expectancy multiplier and fertility multiplier have been introduced in 2022. The population module generates the working-age population. As an example of the crude level of the model calculations, the model is not using age-specific death rates but instead every person in the model is reaching the average life expectancy and then dies. Our hypothesis is that this does not change the overarching image that we provide, but we invite other modelling teams to investigate this further.

Output module. The output module generates real GDP from (1) real capital formation and discard, (2) jobs from the capital labor ratio, and total factor productivity using a Cobb-Douglas function. The output module depicts economies as the sum of a private sector and a public sector, with their separate capitals.

Labor market module. The model separates workers, whose primary source of income is paid labor, from owners, whose primary source of income stems from ownership of the means of production. The module calculates the worker share of output, which increases when labor is in short supply and owners can reduce wages. The long-term dynamics is reflected in the capital-labor ratio – defined as the amount of capital supporting each worker. The capital-labor ratio grows as society gets richer reducing the number of jobs per unit of output.

Public sector and demand modules. The public sector and demand modules calculate total factor productivity which is mainly set exogenously but affected by inequality (negative effect), state capacity (positive effect), and investments in unproductive activities (negative effect. The sectors also generate public spending from tax revenues, the net effect of debt transactions (public and private), and the distribution of the budget on governmental goods and services (including on technological advance and the five turnarounds).

Finance and inventory modules. The finance and inventory modules generate inventories and interest rates. The modules generate short-term (around 4 years) fluctuations in inventory, inflation, interest rates and asset values.

Food and land-use module. The food and land-use module tracks forest areas, croplands, grazing lands, and urban areas. It tracks overall soil quality as a function of fertilizer use and regenerative agricultural practices. Cropland expansion is a function of the size of the population and people's preference for red meats depending on income levels. The sector also calculates yields that are negatively affected by warming but positively affected by increased carbon in the atmosphere.

Energy module. The energy demand is calculated based on the size of the population as well as its overall wealth, accounting for the increasing energy demands of wealthier societies. Energy demand from industries and households is distributed among fossil (for electricity and non-electricity), nuclear and renewable sources. The module calculates the cost of energy and share of renewables with an exogenously defined goal for the fraction of renewable electricity (50%).

Climate module. *Observed warming* is simply calculated as a consequence of the *Extra heat on surface level* resulting from the albedo effect, water vapour, and anthropogenic forcing from greenhouse gases. These include CO_2 from energy and industry (*Energy module*), as well as from LULUC (Land use, and land-use change, from *Food and land-use module*); CH_4 from agriculture and land-use (from *Food and land-use* module); and N_2O from fertilizer use (*Food and land use module*).

Wellbeing, trust and tension module. The wellbeing, trust and tension modules are where the average wellbeing index and social tension index are calculated, using the factors presented earlier in this paper, see above.

2. The use of behavioral fit to guide the model building process

The use of behavioral fit of historic time-series to guide the model building process is common practice for global models[1]. The structuring of a function should not be only a matter of fit to historical data but this needs to be complemented with a sound causal hypothesis so that the model relationships reflect an underlying causal mechanism in the real world. In the construction of the Earth4All-global model, we have observed that under industrial-era capitalism, socioeconomic variables have tended to respond to increases in per-capita GDP in a predictable manner across global regions. These can be viewed as a result of causal chains. We present these stylised relationships below as *guides*, showing how the Earth4All model can broadly replicate these trends globally. In the figures below, these guides are illustrated with broad yellow paint strokes to illustrate the shape of the functions seen and used in the model building process.

1. *Variation of population variables with GDP per person.*

Fertility rate initially declines rapidly as GDP per person increases[2,3]. Following the satisfaction of most basic needs at around $15,000 per person[4], the fertility rate continues to decline albeit much more slowly. Perhaps surprisingly though, there is little macro-econometric evidence to explain this relationship[3,5]. Explanations include: women's empowerment, whereby a better education and more employment opportunities raise the opportunity cost of having children; better access to family planning and contraceptives, more purchasing power gives women greater autonomy over their fertility; the decline of child mortality can lower the number of births required to achieve a certain family size and reduce the anticipation of future child losses; and the rising cost of children as child labour declines, educational expectations rise, and lower child mortality leads parents investing more in each child. Cultural and religious norms as well as state interventions such as China's one-child policy also play a role[6].

Birth rates follow a similar trend to fertility rates. However, the decline at higher levels of GDP is lower since the fertility rate is already affected by the aging of the population. Death rates, meanwhile, are in these graphs also impacted by the changing population structure (in the demographic transition, declines in fertility rates alter the population pyramid resulting in a bigger share of aged people), rapidly declining with initial sharp increases in life expectancy, before slowly rising again.

Similarly, life expectancy rises rapidly with initial increases in GDP per person, slowing substantially after $15,000 per person, then saturating. Child vaccination, sanitation coverage, and (most of all) universal health care are associated with substantial improvements in life expectancy[7]. However, although a higher per capita GDP 'creates the longer-term *potential* for population health improvements', writes Szreter, 'the human record in fact shows no *necessary* direct relationship between economic advance and human health'[8]. In 19th-century Britain, for example, the collapse in life expectancy that accompanied urbanization did not significantly recover until working class movements won extensive public health and sanitation programs, despite ongoing economic growth[8]. In our dataset, European countries on average achieve higher levels of life expectancy than the

USA, despite mean per capita GDP a third lower – likely due to public healthcare systems which decouple an individual's income from their access to healthcare.

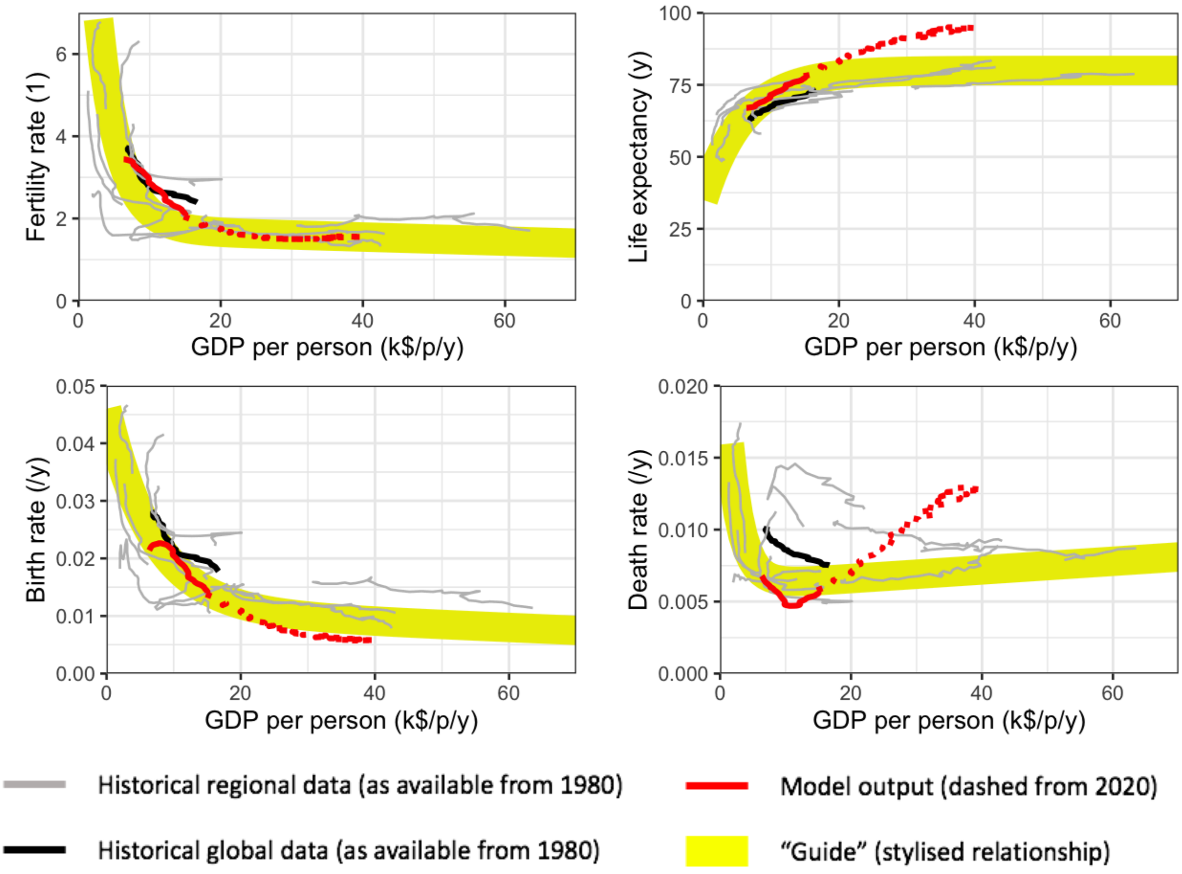

Figure 1: Stylised relationships with regards to fertility rate, life expectancy, birth rate and death rate. Data sources: Penn World Tables[9], World Bank[10] and United Nations[11].

2. *Variation of biophysical variables with GDP per person.*

Energy use, carbon emissions, and electricity use per person rise sub-linearly with GDP per person, consistent with studies finding income elasticities of carbon and energy consumption of less than one[12]. Variations in biophysical variables between regions can be attributed to region-specific factors such as climate, urban design, public transport availability, and the efficiency level attainable in a specific year[13]. Although some absolute decoupling is visible at the regional level, this can often be attributed to offshoring and thus cannot be extended to the global level. Overall, there is a broad consensus within the decoupling literature that (1) absolute decoupling of CO_2 emissions from GDP is rare, entirely absent at the global level, and insufficient to address to meet climate targets when present; and (2) GDP is strongly coupled to useful exergy – 'a measurement of energy that quantifies the potential of an energy flow to do physical work'[14] – and thus 'primary energy can be decoupled from GDP largely to the extent to which the conversion of primary energy to useful exergy is improved'[15–17].

Our data suggests a stronger coupling between electricity production and GDP than for energy use. In addition to the coupling between energy use and GDP, this is likely due to household electricity access growing with GDP[18], the slow gains in global electricity conversion efficiency since 1980, and efficiency 'dilution', 'wherein individual end-use efficiency gains are offset by increasing uptake of less efficient end uses'[14].

By contrast, crop use per person saturates, illustrating the satiability of human nutritional needs. The regional variation reflects the calorie-density of crops and the efficiency of food distribution. The model saturates at a substantially higher level since it includes crops grown for animal feed, in addition to direct crop consumption shown in this figure. Here, the increase of meat consumption with rising incomes may also have an impact as meat production requires significantly more crop production[19].

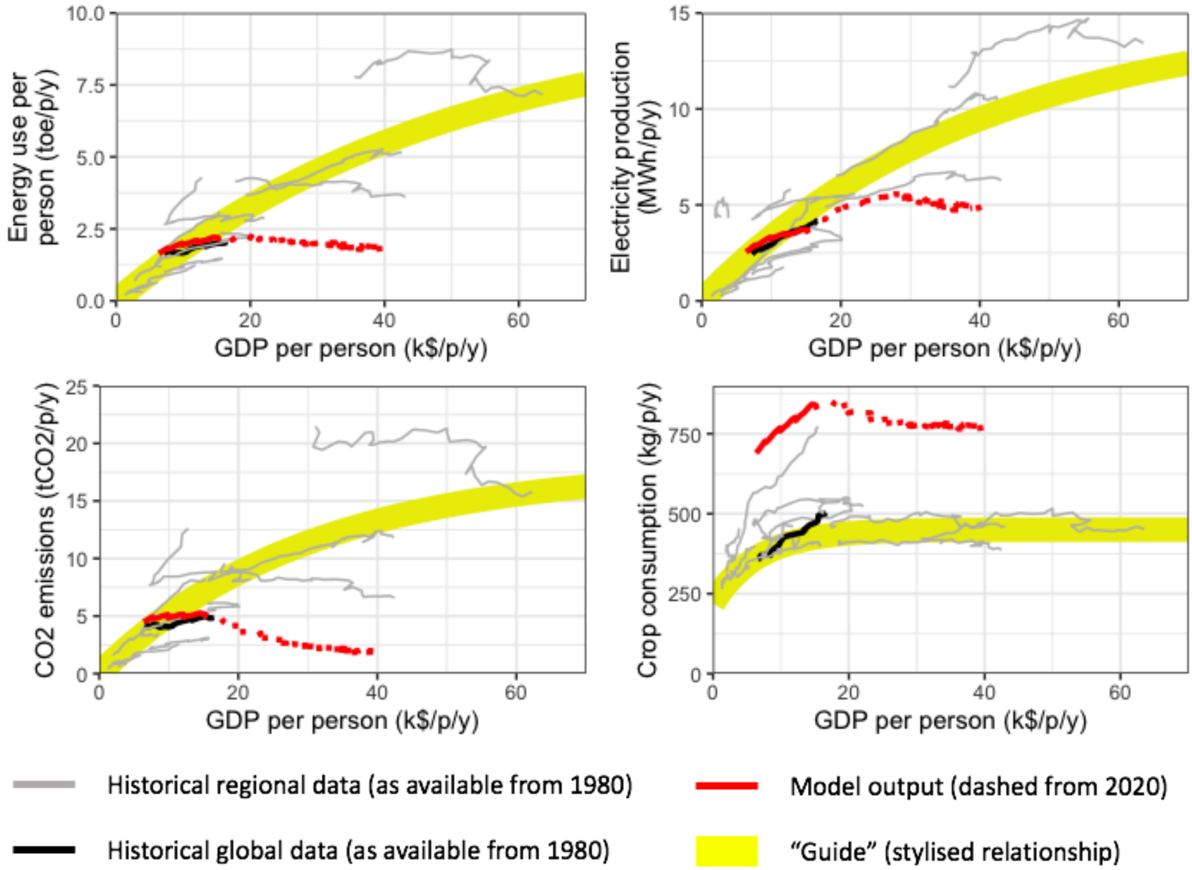

Figure 2: Statistical guides with regards to energy use per person, electricity production, CO2 emissions and Crop use. Data sources: BP[20], PRIMAP[21,22] and FAO[23,24].

3. *Variation of production variables with GDP per person.*

Our data on GDP growth rate follows a similar trend to those of the Shared Socioeconomic Pathways (SSPs), especially SSP2 and SSP1 [25,26]. The rapid growth rate at low levels of GDP per person is made possible as peasants and previously nonmarket activities are subsumed into the market[27]. Following a peak in the range of $8,000–13,000 per person, GDP growth declines as the availability of profitable investment opportunities decreases. As a result, the owners of capital turn towards financial markets and intensify rent-seeking, further suppressing growth[28–30]. As a study by the Bank for International Settlements concluded, 'The growth of a country's financial system is a drag on productivity growth [and] reduces real growth [...] financial booms are not, in general, growth-enhancing, likely because the financial sector competes with the rest of the economy for resources.'[31]

The capital-output ratio (COR) rises at a decreasing rate due to the decreasing marginal utility of capital, before slowly falling. The capital-labor ratio (CLR), meanwhile, rises relatively linearly with GDP per person, a relationship that can be interpreted in several ways. First, as GDP grows the capital stock will also grow, assuming some profits are reinvested. Second, if the workforce becomes more skilled at higher levels of GDP, they can operate more capital. And third, competition drives capitalists to improve labor productivity in order to raise relative surplus value, resulting in an increasingly capital-intensive production process[32]. Finally, a note that if the COR is constant, the slope of the CLR will be determined by the workforce participation rate[1].

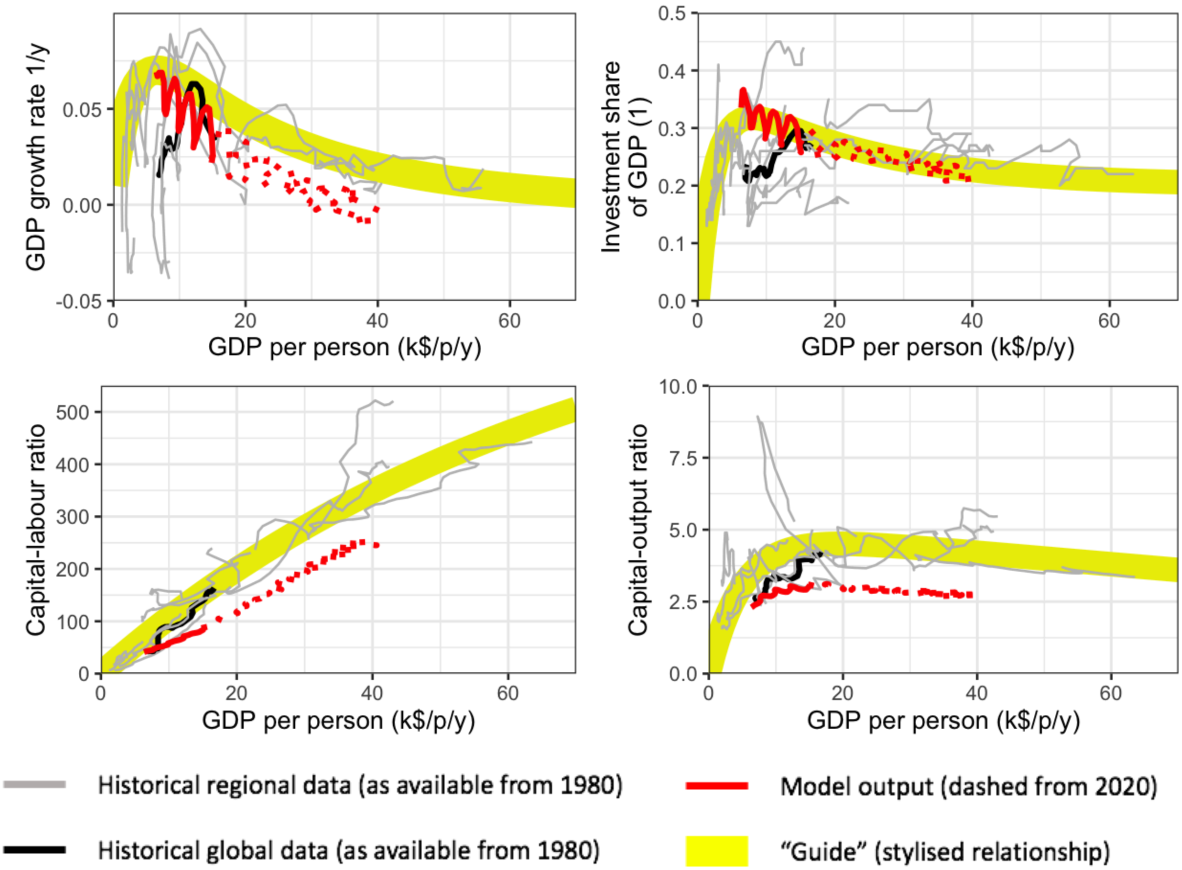

Figure 3: Statistical guides with regards to GDP growth rate, investment share of GDP, Capital-labor ratio and capital-output ratio. Data source: Penn World Tables[9].

4. *Variation of consumption variables with GDP per person.*

The consumption and savings rates follow reciprocal trends. At low levels of GDP per person, a high proportion of income is consumed in order to buy essentials, however as GDP per person rises, an increasing proportion of income can be saved to provide a safety cushion. Once these savings have been built up, the consumption share of GDP rises again.

Government spending as a share of GDP rises and declines, with the peak determined by the cost of basic services assuming that citizens' demand these from the government. The fraction stagnates, however, since continual government spending is required to ensure continued economic expansion and prevent crises of overproduction[33]. Various perspectives seek to explain the size of the welfare state, including the *logic of industrialism* approach which argues that public spending expands to fill the gaps left by the disruption of traditional modes of care; the *capitalist development* view which argues that

[1] CLR = COR*LP = COR*Q/L = COR*Q/wpr/POP

the welfare state “softens” capitalism, reducing social conflict; and *power-resource theory* which argues ‘the welfare state is an outcome of, and an arena for, conflicts between class-related socioeconomic interest groups such as political parties, trade unions, and employer organizations.’[34–36] Note that our dataset coincides with the onset of neoliberalisation which entailed cutting state spending, enforced most severely on Global South via structural adjustment policies[37,38]. Tax rates tend to be fairly constant around a regional level.

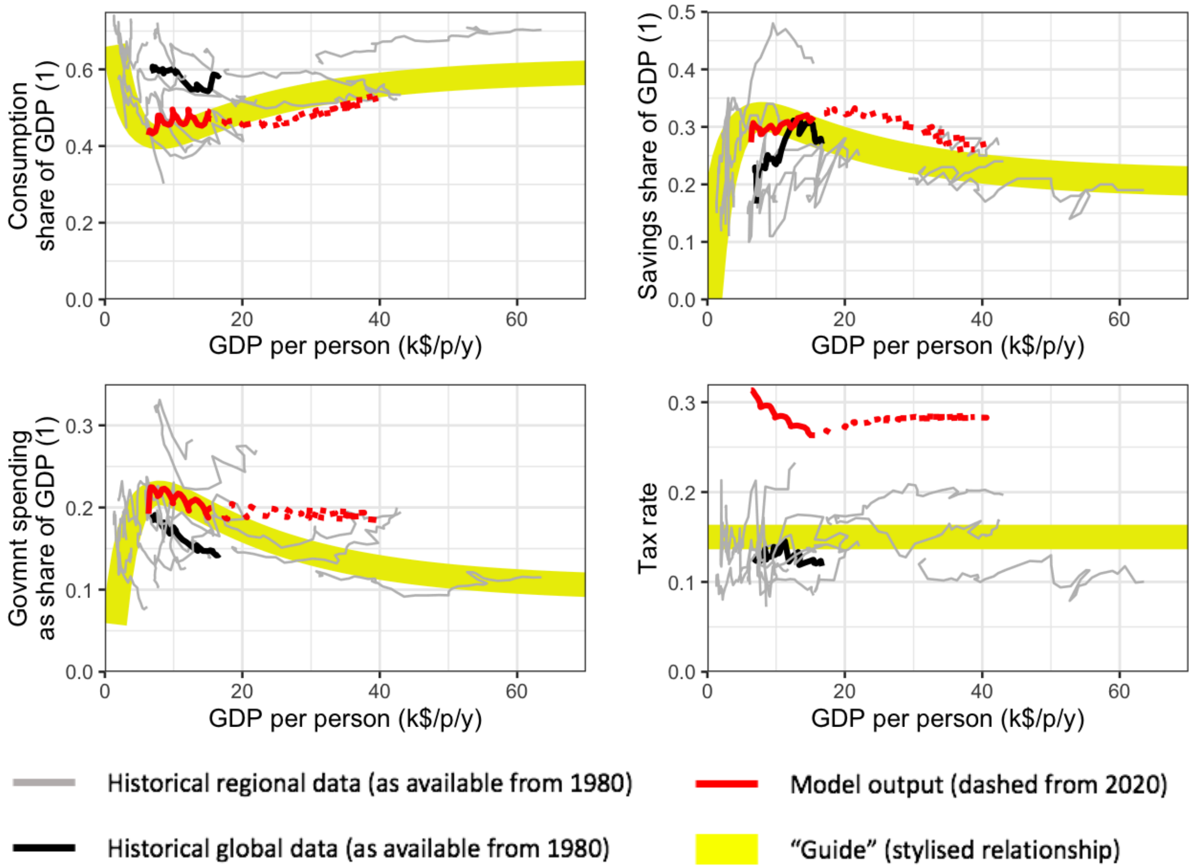

Figure 4: Statistical guides for consumption, savings and government spendings’ share of GDP as well as tax rate. Data source: Penn World Tables[9].

3. Limitations and potential model improvements

In the spirit of Saltelli et al.[39], we strive to be open about the limitations and assumptions in the Earth4All model. While the Earth4All model is replicating historical behaviours and accounts for some main macro feedbacks reflected in the world system, no model is complete and also the Earth4All model should be seen as a work in progress. We build on five leading global datasources detailed below.

There are a number of known limitations, among them: Fertility and mortality rates have been slightly modified in order for the model to be closer to the Shared Socioeconomic Pathways from 2022. The model assumes no structural change (except for when it comes to the TAs being implemented) – particularly when it comes to implications of long-term falling GDP.
We use global averages – e.g. lack of international inequalities assume all people benefit equally from global public spending. We simulate "What-if" trajectories by using policy targets to drive the model to achieve some of the turnarounds in the Giant Leap scenario. The policy change process is thus only partly endogenised.

Furthermore, as referred to in the main text, the increase in environmental and social risks moves the world towards a more unstable trajectory. While some environmental effects on the population are incorporated in the model, it is difficult to judge the potential consequences of transgressing multiple planetary thresholds. Below we summarize some of the future directions of the model that we suggest:

- The function for total factor productivity incorporates a Solovian growth model using a Cobb-Douglas function. Although the growth rate productivity is affected by different endogenized processes (including warming and inequality), it is still largely exogenous. Productivity could be further endogenized in the model.
- Improving the climate module. The module is currently limited and while the results reproduce historical values and match behaviours of more complicated models (including ESMICON[40]), it needs to be better tuned.
- The energy sector of the model could be better endogenized to the rest of the model. For example, further improving the link between energy and economic output.
- The food and land use sector could be tuned to better match historical data.
- The model's inequality concept could be improved so that it could track indicators such as the Palma ratio or Gini coefficient.
- The costs for the turnarounds could be better accounted for so that the model can compare costs and gains between the two scenarios.

- The finance sector could be further improved to account for handling Minsky instability, investments in financial assets compared to real assets and the effects on the capital labor ratio (see [41]).
- A materials sector of the model could be added to account for how material constraints affect the rest of the model (handling non-energy and non-food resource scarcities including water, technological advance and learning curves).
- While the gains from having a very simple population module that accounts for main age cohorts, long-term population trajectories could be better accounted for by including age-specific mortality rates. The effect of climate change on mortality rates could then be further incorporated.
- The internal dynamics of the agricultural transition towards regenerative agriculture could be further expanded, as well as incorporating a non-linear effect of warming on crop yields.

We rely on the following five primary data sources for model calibration between 1980 and 2020: UN population data for total population, fertility rates, and mortality rates (United Nations Population Division 2020); The Penn World Tables for macroeconomic model calibration – including GDP levels, government spending and consumption (Feenstra et al. 2015); BP Statistical Review of World Energy including energy sources and total production; EDGAR for climate-related data (Crippa et al. 2024), including emissions and emission types; and the World Bank Development Indicators (World Bank 2018).

Main data sources for Earth4All global model:

- United Nations, Department of Economic and Social Affairs, Population Division (2020) Demographic yearbook
- Feenstra RC, Inklaar R, Timmer MP (2015) The next generation of the Penn World Table. Am Econ Rev 105(10):3150–3182
- BP Statistical review of world energy
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- World Bank (2018) World Development Indicators (WDI)

4. References

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5. Model equations

General:

Total	**Count**
Variables	917
Modules	12
Stocks	36
Flows	54
Converters	827
Constants	326
Equations	555
Graphicals	18
Macro Variables	145

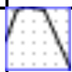
Differences between Giant Leap (GL) and Too Little Too Late (TLTL):

Model variable with units, per turnaround:	**Giant Leap (GL)**	**TLTL / Baseline**
Poverty turnaround levers / variables exogenously set from 2022:		
Fraction of govmnt debt cancelled in 2022 1/y	0,1	0
Max imported ROTA from 2022 1/y	0,005	0
Unconventional stimulus in PIS from 2022 (share of GDP)	0,01	0
Unconventional stimulus in PUS from 2022 (share of GDP)	0,01	0
Inequality turnaround levers:		
Extra transfer of govmnt budget to workers (1)	0,2	0
Fraction of extra taxes paid by owners (1)	0,8	0,5
Goal for extra income from commons (share of NI)	0,02	0
Empowerment turnaround levers:		
Extra empowerment tax from 2022 (share of NI)	0,02	0
Goal for extra fertility reduction (1)	0,2	0
Extra general tax rate from 2022 (1)	0,01	0
Extra pension tax from 2022 (share of NI)	0,02	0
Food turnaround levers:		
Extra rate of decline in CH4 pr kg crop after 2022 1/y	0,01	0
Extra rate of decline in N2O per kg fertilizer from 2022 1/y	0,01	0
Extra ROC in food sector productivity from 2022 1/y	1	
Goal for crop waste reduction (1)	0,2	0,05
Goal for fraction new red meat (1)	0,5	0,1
Goal for fraction regenerative agriculture (1)	0,5	0,1
Energy turnaround levers:		
Extra ROC in energy productivity after 2022 1/y	0,004	0,002
Goal for fraction new electrification (1)	1	0,5
Goal for renewable el fraction (1)	1	0,5
Goal for fraction of CO2-sources with CCS (1)	0,9	0,2
Direct air capture of CO2 in 2100 GtCO2/y	8	0

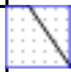
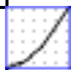
All Equations, by sub-module (Climate, Demand, etc):

		Equation	Properties	Units
	Top-Level Model:			
	Climate:			
±	CH4_in_atmosphere_GtCH4(t)	CH4_in_atmosphere_GtCH4(t - dt) + ("CH4_emissions_GtCH4/y" - "CH4_breakdown_GtCH4/y") * dt	INIT CH4_in_atmosphere_GtCH4 = CH4_in_atm_in_1980_GtCH4	Gt
±	CO2_in_atmosphere_GtCO2(t)	CO2_in_atmosphere_GtCO2(t - dt) + (CO2_in_atmosphere_GtCO2_net_flow) * dt	INIT CO2_in_atmosphere_GtCO2 = CO2_in_atm_in_1980_GtCO2	GtC
±	Extra_heat_in_surface_ZJ(t)	Extra_heat_in_surface_ZJ(t - dt) + ("Extra_warming_from_forcing_ZJ/y" - "Extra_cooling_from_ice_melt_ZJ/y" - "Heat_to_deep_ocean_ZJ/y" - "Heat_to_space_ZJ/y") * dt	INIT Extra_heat_in_surface_ZJ = Extra_heat_in_1980_ZJ	ZJ
±	Ice_and_snow_cover_excl_G&A_Mkm2(t)	_Mkm2(t - dt) + (- "Melting_Mha/y") * dt	Ice_and_snow_cover_excl_G&A_Mk	Gkm2
±	N2O_in_atmosphere_GtN2O(t)	N2O_in_atmosphere_GtN2O(t - dt) + ("N2O_emissions_GtN2O/y" - "N2O_breakdown_GtN2O/y") * dt	INIT N2O_in_atmosphere_GtN2O = N2O_in_atm_in_1980_GtN2O	GtN2O
	"CH4_breakdown_GtCH4/y"	CH4_in_atmosphere_GtCH4/Life_of_CH4_in_atm_y		Gt/Year
	"CH4_emissions_GtCH4/y"	"Man-made_CH4_emissions_GtCH4/y"+"Natural_CH4_emissions_GtCH4/y"		Gt/Year
	"CO2_absorption_GtCO2/y"	(CO2_in_atmosphere_GtCO2-CO2_in_atm_in_1850_GtCO2)/Life_of_extra_CO2_in_atm_y		GtCO2/y
	"CO2_emissions_GtCO2/y"	Energy."CO2_from_energy_and_industry_GtCO2/y"+Food_and_land_use."CO2_emissions_from_LULUC_GtCO2/y"-"Direct_air_capture_of_CO2_GtCO2/y"		GtCO2/y
	"CO2_from_CH4_GtCO2/y"	"CH4_breakdown_GtCH4/y"*tCO2_per_tCH4		Gt/y
	CO2_in_atmosphere_GtCO2_net_flow	"CO2_emissions_GtCO2/y"+"CO2_from_CH4_GtCO2/y"-"CO2_absorption_GtCO2/y"+"CO2_from_CH4_GtCO2/y"		GtC/Year
	"Extra_cooling_from_ice_melt_ZJ/y"	"Melting_rate_deep_ice_1/y"*Amount_of_ice_in_1980_Mkm3*Ton_per_m3_ice*"Heat_required_to_melt_ice_kJ/kg"		ZJ/Year
	"Extra_warming_from_forcing_ZJ/y"	("Total_man-made_forcing_W/m2"*Global_surface_Mkm2)*31.5/1000		ZJ/Year

	"Heat_to_deep_ocean_ZJ/y"	Extra_heat_in_surface_ZJ*"Transfer_rate_for_heat_going_to_abyss_1/y"		ZJ/Year
	"Heat_to_space_ZJ/y"	Extra_heat_in_surface_ZJ*"Transfer_rate_for_heat_going_to_space_1/y"		ZJ/Year
	"Melting_Mha/y"	Ice_and_snow_cover_excl_G&A_Mkm2*"Melting_rate_surface_1/y"		Gkm2/Year
	"N2O_breakdown_GtN2O/y"	N2O_in_atmosphere_GtN2O/Life_of_N2O_in_atm_y		GtN2O/Year
	"N2O_emissions_GtN2O/y"	"Natural_N2O_emissions_GtN2O/y"+"Man-made_N2O_emissions_GtN2O/y"		GtN2O/Year
	"Albedo_(1)"	(Ice_and_snow_cover_excl_G&A_Mkm2*"Albedo_ice_and_snow_(1)"+(Global_surface_Mkm2-Ice_and_snow_cover_excl_G&A_Mkm2)*"Albedo_global_average_(1)")/Global_surface_Mkm2		1
	"Albedo_global_average_(1)"	0,3		1
	"Albedo_ice_and_snow_(1)"	0,7		1
	"Albedo_in_1980_(1)"	(Ice_and_snow_cover_excl_Greenland_and_Antarctica_in_1980_Mkm2*"Albedo_ice_and_snow_(1)"+(Global_surface_Mkm2-Ice_and_snow_cover_excl_Greenland_and_Antarctica_in_1980_Mkm2)*"Albedo_global_average_(1)")/Global_surface_Mkm2		1
	Amount_of_ice_in_1980_Mkm3	55		Mkm3
	CH4_conc_in_1980_ppm	CH4_in_atm_in_1980_GtCH4/Mass_of_atmosphere_Zt		
	CH4_concentration_in_atm_ppm	CH4_in_atmosphere_GtCH4/GtCH4_per_ppm		ppm
	"CH4_forcing_per_ppm_W/m2/ppm"	GRAPH(TIME) Points: (1980.0, 0.8200), (2000.0, 0.9400), (2020.0, 1.0100), (2100.0, 1.1000)		W/(m2*ppm)
	CH4_in_atm_in_1980_GtCH4	2,5		Gt/y
	CO2_concentration_in_1980_ppm	330		ppm
	CO2_concentration_in_2022_ppm	420		ppm
	CO2_concentration_in_atm_ppm	CO2_in_atmosphere_GtCO2/GtCO2_per_ppm		ppm
	"CO2_forcing_per_ppm_W/m2/ppm"	GRAPH(TIME) Points: (1980.0, 0.0032), (1990.0, 0.0041), (2000.0, 0.0046), (2020.0, 0.0051), (2100.0, 0.006)		W/(m2*ppm)
	CO2_in_atm_in_1850_GtCO2	2200		GtCO2

	CO2_in_atm_in_1980_GtCO2	2600		GtCO2
	"CO2_per_GDP_(kgCO2/$)"	("CO2_emissions_GtCO2/y"/Inventory."GDP_G$/y")*1000		tCO2/$
	"Cost_of_air_capture_G$/y"	"Direct_air_capture_of_CO2_GtCO2/y"*Energy."Cost_of_CCS_$/tCO2"		G$/y
	"Direct_air_capture_of_CO2_GtCO2/y"	(IF TIME > 2022 THEN RAMP(("Direct_air_capture_of_CO2_in_2100_GtCO2/y")/Wellbeing_trust_and_tension.Introduction_period_for_policy_y, 2022, 2022+Wellbeing_trust_and_tension.Introduction_period_for_policy_y) ELSE 0)		Gt/y
	"Direct_air_capture_of_CO2_in_2100_GtCO	0		GtCO2/y
	Extra_heat_in_1980_ZJ	0		ZJ
	"Extra_rate_of_decline_in_CH4_pr_kg_crop_after_2022_1/y"	0		1/y
	"Extra_rate_of_decline_in_N2O_per_kg_fertilizer_from_2022_1/y"	0		1/y
	"Forcing_from_CH4_W/m2"	CH4_concentration_in_atm_ppm*"CH4_forcing_per_ppm_W/m2/		W/m2
	"Forcing_from_CO2_in_1980_W/m2"	1,07		W/m2
	"Forcing_from_CO2_W/m2"	CO2_concentration_in_atm_ppm*"CO2_forcing_per_ppm_W/m2/		W/m2
	"Forcing_from_N2O_W/m2"	N2O_concentration_in_atm_ppm*"N2O_forcing_per_ppm_W/m2/		W/m2
	"Forcing_from_other_gases_W/m2"	GRAPH(TIME) Points: (1980.0, 0.1800), (2000.0, 0.3600), (2020.0, 0.3900), (2050.0, 0.3700), (2100.0, 0.0000)		W/m2
	"GHG_EMISSIONS_GtCO2e/y"	"CO2_emissions_GtCO2/y"*"tCO2e/tCO2"+"CH4_emissions_GtCH4/y"*"tCO2e/tCH4"+"N2O_emissions_GtN2O/y"*"tCO2e/tN2O"		GtCO2e/y
	Global_surface_Mkm2	510		Mkm2
	GtCH4_per_ppm	5		GtCH4/ppm
	GtCO2_per_ppm	7,9		GtCO2/ppm
	GtN2O_per_ppm	5		Gt/ppm
	"Heat_required_to_melt_ice_kJ/kg"	333		kJ/kg
	Ice_and_snow_cover_excl_Greenland_and_Antarctica_in_1980_Mkm2	12		Mkm2
	Ice_and_snow_cover_Mha	Ice_and_snow_cover_excl_G&A_Mkm2*100		Mha

	kg_CH4_emission_per_kg_crop	kg_CH4_per_kg_crop_in_1980*EXP(-("Rate_of_decline_in_CH4_per_kg_crop_1/y")*(TIME-1980))*(IF TIME > 2022 THEN EXP(-("Extra_rate_of_decline_in_CH4_pr_kg_crop_after_2022_1/y")*(TIME-2022)) ELSE 1)		1
	kg_CH4_per_$_of_GDP	0		
	kg_CH4_per_kg_crop_in_1980	0,05		1
	kg_N2O_emission_per_kg_fertiliser	kg_N2O_per_kg_fertilizer_in_1980*EXP(-("Rate_of_decline_in_N2O_per_kg_fertiliser_1/y")*(TIME-1980))*(IF TIME > 2022 THEN EXP(-("Extra_rate_of_decline_in_N2O_per_kg_fertilizer_from_2022_1/y")*(TIME-2022)) ELSE 1)		1
	kg_N2O_per_kg_fertilizer_in_1980	0,11		1
	Life_of_CH4_in_atm_y	7,5		y
	Life_of_extra_CO2_in_atm_in_1980_y	60		y
	Life_of_extra_CO2_in_atm_y	Life_of_extra_CO2_in_atm_in_1980_y*OWeoLoCO2		y
	Life_of_N2O_in_atm_y	95		y
	"Man-made_CH4_emissions_GtCH4/y"	(Food_and_land_use."Crop_supply_(after_20_%_waste)_Mt-crop/y"*kg_CH4_emission_per_kg_crop)/1000		Gt/y
	"Man-made_forcing_W/m2"	"Forcing_from_CO2_W/m2"+"Forcing_from_CH4_W/m2"+"Forcing_from_N2O_W/m2"+"Forcing_from_other_gases_W/m2"		
	"Man-made_N2O_emissions_GtN2O/y"	Food_and_land_use."Fertilizer_use_Mt/y"*kg_N2O_emission_per_kg_fertiliser/1000		Gt/y
	Mass_of_atmosphere_Zt	5		Zt
	"Melting_rate_deep_ice_1/y"	"Melting_rate_surface_1/y"/"Surface_vs_deep_rate_(1)"		1/y
	"Melting_rate_surface_1/y"	"Melting_rate_surface_in_1980_1/y"*(Observed_warming_deg_C/Warming_in_1980_deg_C)		1/y
	"Melting_rate_surface_in_1980_1/y"	0,0015		1/y
	N2O_conc_in_1980_ppm	N2O_in_atm_in_1980_GtN2O/Mass_of_atmosphere_Zt		ppm
	N2O_concentration_in_atm_ppm	N2O_in_atmosphere_GtN2O/GtN2O_per_ppm		ppm

	"N2O_forcing_per_ppm_W/m2/ppm"	GRAPH(TIME) Points: (1980.0, 0.4300), (2000.0, 0.6400), (2010.0, 0.7300), (2020.0, 0.8000), (2100.0, 1.0000)		1
	N2O_in_atm_in_1980_GtN2O	1,052		GtN2O
	"Natural_CH4_emissions_GtCH4/y"	GRAPH(TIME) Points: (1980.0, 0.190), (2020.0, 0.190), (2100.0,		
	"Natural_N2O_emissions_GtN2O/y"	GRAPH(TIME) Points: (1980.0, 0.009), (2020.0, 0.009), (2099.27, 0)		
	Observed_warming_deg_C	Warming_in_1980_deg_C+(Extra_heat_in_surface_ZJ-Extra_heat_in_1980_ZJ)*"Warming_from_extra_heat_deg/ZJ"		deg C
	Observed_warming_in_2022_deg_C	1,35		deg C
	OWeoLoCO2	(IF TIME > 2022 THEN 1+"sOWeoLoCO2>0"*(Observed_warming_deg_C/Observed_warming_in_2022_deg_C-1) ELSE 1)		1
	Perceived_warming_deg_C	SMTH1(Observed_warming_deg_C, Perception_delay_y)		deg C
	Perception_delay_y	5		y
	"Rate_of_decline_in_CH4_per_kg_crop_1/y"	0,01		1/y
	"Rate_of_decline_in_N2O_per_kg_fertiliser_1/y"	0,01		1/y
	"Risk_of_extreme_heat_event_(1)"	GRAPH(Observed_warming_deg_C) Points: (0.000, 1.00), (1.200, 4.80), (2.000, 8.60), (2.900, 14.00), (5.200, 40.00)		1
	"sOWeoLoCO2>0"	1		1
	"sOWeoWV>0"	0,18		1
	"Surface_vs_deep_rate_(1)"	4		1
	"sWVeoWVF>0"	3		1
	tCO2_per_tCH4	2,75		1
	"tCO2e/tCH4"	23		1
	"tCO2e/tCO2"	1		1
	"tCO2e/tN2O"	7		1
	Ton_per_m3_ice	0,95		t/m3
	"Total_man-made_forcing_W/m2"	"Man-made_forcing_W/m2"+"Water_v		W/m2
	"Transfer_rate_for_heat_going_to_abyss_1/y"	"Transfer_rate_surface-abyss_in_1980_1/y"*((Observed_warming_deg_C+287)/287)		1/y
	"Transfer_rate_for_heat_going_to_space_1/y"	("Transfer_rate_surface-space_in_1980_1/y"*((Observed_warming_deg_C+297)/297))*("Albedo_(1)"/"Albedo_in_1980_(1)")		1/y
	"Transfer_rate_surface-abyss_in_1980_1/y"	0,01		y
	"Transfer_rate_surfac			

	e-space_in_1980_1/y"	0,01		1/y
	"Warming_from_extra_heat_deg/ZJ"	0,0006		1
	Warming_in_1980_deg_C	0,4		deg C
	"Water_vapor_concentration_g/kg"	"Water_vapour_concentration_1980_g/kg"*(1+"sOWeoWV>0"*(Observed_warming_deg_C/Warming_in_1980_deg_C-1))		g/kg
	"Water_vapor_feedback_in_1980_W/m2"	0,9		W/m2
	"Water_vapour_concentration_1980_g/kg"	2		g/kg
	"Water_vapour_feedback_W/m2"	"Water_vapor_feedback_in_1980_W/m2"*(1+"sWVeoWVF>0"*("Water_vapor_concentration_g/kg"/"Water_vapour_concentration_1980_g/kg"-1))		1
	Demand:			
	Govmnt_debt_G$(t)	Govmnt_debt_G$(t - dt) + ("Govmnt_new_debt_G$/y" - "Cancellation_of_debt_G$/y" - "Govmnt_payback_G$/y") * dt	INIT Govmnt_debt_G$ = Govmnt_debt_in_1980_G$	G$
	Workers_debt_G$(t)	Workers_debt_G$(t - dt) + ("Workers_new_debt_G$/y" - "Workers_payback_G$/y") * dt	INIT Workers_debt_G$ = Workers_debt_in_1980_G$	G$
	"Cancellation_of_debt_G$/y"	(IF TIME >= (2022) AND TIME < ((2022) + MAX(DT,1)) THEN 1 ELSE 0)*Govmnt_debt_G$*"Fraction_of_govmnt_debt_cancelled_in_2022_1/y"		G$/Year
	"Govmnt_new_debt_G$/y"	MAX(0, (Max_govmnt_debt_G$-Govmnt_debt_G$)/Govmnt_drawdown_period_y)+STEP("Govmnt_stimulus_from_2022_(share_of_NI)", 2022)*Inventory."National_income_G$/y"		G$/Year
	"Govmnt_payback_G$/y"	Govmnt_debt_G$/Govmnt_payback_period_y		G$/Year
	"Workers_new_debt_G$/y"	MAX(0, (Max_workers_debt_G$-Workers_debt_G$)/Workers_drawdown_period_y)		G$/Year
	"Workers_payback_G$/y"	Workers_debt_G$/Workers_payback_period_y		G$/Year
	"Bank_cash_inflow_as_share_of_NI_(1)"	"Bank_cash_inflow_from_lending_G$/y"/Inventory."National_income_G$/y"		1
	"Bank_cash_inflow_from_lending_G$/y"	"Cash_flow_from_workers_to_banks_G$/y"+"Cash_flow_from_govmnt_to_banks_G$/y"		G$/y

	"Basic_income_tax_rate_owners_(1)"	MIN(1, "Income_tax_rate_owners_in_1980_(1)"+RAMP(("Income_tax_rate_owners_in_2022_(1)"-"Income_tax_rate_owners_in_1980_(1)")/42, 1980, 2022)+RAMP(("Goal_for_income_tax_rate_owners_(1)"-"Income_tax_rate_owners_in_2022_(1)")/78, 2022, 2100))		1
	"Basic_income_tax_rate_workers_(1)"	0,2		1
	"Cash_flow_from_govmnt_to_banks_G$/y"	"Govmnt_interest_cost_G$/y"+"Govmnt_payback_G$/y"-"Govmnt_new_debt_G$/y"		G$/y
	"Cash_flow_from_workers_to_banks_G$/y"	"Worker_interest_cost_G$/y"+"Workers_payback_G$/y"-"Workers_new_debt_G$/y"		G$/y
	"Consumption_demand_G$/y"	"Worker_consumption_demand_G$/y"-"Sales_tax_workers_G$/y"+"Owner_consumption_G$/y"-"Sales_tax_owners_G$/y"		G$/y
	"Consumption_per_person_G$/y"	"Consumption_demand_G$/y"/Population.Population_Mp		G$/y
	"Consumption_share_of_GDP_(1)"	"Consumption_demand_G$/y"/Inventory."National_income_G$/y"		1
	"Control:_(C+G+S)/NI_=_1"	"Consumption_share_of_GDP_(1)"+"Govmnt_share_of_GDP_(1)"+"Savings_share_of_GDP_(1)"		1
	"Extra_empowerment_tax_from_2022_(share_of_NI)"	0		1
	"Extra_general_tax_from_2022_G$/y"	(IF TIME > 2022 THEN "Extra_general_tax_rate_from_2022_(1)"+"Extra_empowerment_tax_from_2022_(share_of_NI)"+"Extra_pension_tax_from_2022_(share_of_NI)" ELSE 0)*Inventory."National_income_G$/y"		1
	"Extra_general_tax_rate_from_2022_(1)"	0		1
	"Extra_pension_tax_from_2022_(share_of_NI)"	0		1
	"Extra_taxes_for_TAs_from_2022_G$/y"	(IF TIME > 2022 THEN Public_sector."Extra_cost_of_TAs_from_2022_G$/y"*"Fraction_of_extra_TA_cost_paid_by_extra_taxes_(1)" ELSE 0)		1
	"Extra_taxes_from_2022_G$/y"	SMTH1("Goal_for_extra_taxes_from_2022_G$/y", Time_to_implement_new_taxes_y)		G$/y
	"Extra_transfer_of_govmnt_budget_to_work	0		1

	"Fraction_of_extra_TA_cost_paid_by_extra_taxes_(1)"	0,5		1
	"Fraction_of_extra_taxes_paid_by_owners_(1)"	0,5		1
	"Fraction_of_govmnt_budget_to_workers_(1)"	SMTH1("Goal_for_fraction_of_govmnt_budget_to_workers_(1)", Time_to_implement_new_taxes_y)		1
	"Fraction_of_govmnt_debt_cancelled_in_2022_1/y"	0		1/y
	"Fraction_transferred_in_1980_(1)"	0,3		
	GCI_in_1980	5400		G$/y
	"Goal_for_extra_income_from_commons_(share_of_NI)"	0		1
	"Goal_for_extra_taxes_from_2022_G$/y"	"Extra_general_tax_from_2022_G$/y"+"Extra_taxes_for_TAs_from_2022_G$/y"		
	"Goal_for_fraction_of_govmnt_budget_to_workers_(1)"	"Fraction_transferred_in_1980_(1)"+(IF TIME > 2022 THEN "Extra_transfer_of_govmnt_budget_to_workers_(1)" ELSE 0)		1
	"Goal_for_income_tax_rate_owners_(1)"	0,3		1
	"Government_consumption_fraction_(1)"	0,75		1
	"Govmnt_cash_inflow_G$/y"	"Govmnt_net_income_G$/y"-"Cash_flow_from_govmnt_to_banks_G$/y"		G$/y
	Govmnt_debt_burden_y	Govmnt_debt_G$/Inventory."National_income_G$/y"		y
	Govmnt_debt_in_1980_G$	28087*Mult_to_avoid_transient_in_govmnt_finance		G$
	Govmnt_drawdown_period_y	10		y
	"Govmnt_finance_as_share_of_NI_(1)"	("Govmnt_interest_cost_G$/y"+"Govmnt_payback_G$/y")/Inventory."National_income_G$/y"		
	"Govmnt_gross_income_(as_share_of_NI)"	"Govmnt_gross_income_G$/y"/Inventory."National_income_G$/y"		1
	"Govmnt_gross_income_G$/y"	"Worker_taxes_G$/y"+"Owner_taxes_G$/y"+"Sales_tax_workers_G$/y"+"Sales_tax_owners_G$/y"+"Income_from_commons_from_2022_G$/y"		G$/y
	"Govmnt_interest_cost_G$/y"	Govmnt_debt_G$*Finance."Govmnt_borrowing_cost_1/y"		G$/y
	"Govmnt_investment_in_public_capacity_G$/y"	"Permanent_govmnt_cash_inflow_G$/y"-"Govmnt_purchases_G$/y"		G$/y

	"Govmnt_net_income_as_share_of_NI_(1)"	"Govmnt_net_income_G$/y"/Inventory."National_income_G$/y"		1
	"Govmnt_net_income_G$/y"	"Govmnt_gross_income_G$/y"-"Transfer_payments_G$/y"+"Sales_tax_G$/y"		G$/y
	Govmnt_payback_period_y	200		y
	"Govmnt_purchases_G$/y"	"Permanent_govmnt_cash_inflow_G$/y"*"Government_consumption_fraction_(1)"		G$/y
	"Govmnt_share_of_GDP_(1)"	"Govmnt_spending_G$/y"/Inventory."National_income_G$/y"		
	"Govmnt_spending_G$/y"	"Govmnt_purchases_G$/y"+"Govmnt_investment_in_public_capacity_G$/y"		G$/y
	"Govmnt_stimulus_from_2022_(share_of_NI)"	0		1
	"Income_from_commons_from_2022_G$/y"	Inventory."National_income_G$/y"*(IF TIME > 2022 THEN RAMP("Goal_for_extra_income_from_commons_(share_of_NI)"/ Wellbeing_trust_and_tension.Introduction_period_for_policy_y, 2022, 2020+Wellbeing_trust_and_tension.Introduction_period_for_policy_y) ELSE 0)		G$/y
	"Income_tax_owners_(1)"	"Basic_income_tax_rate_owners_(1)"*Inventory."National_income_G$/y"*(1-Labour_market."Worker_share_of_output_(1)")		1
	"Income_tax_rate_owners_in_1980_(1)"	0,4		1
	"Income_tax_rate_owners_in_2022_(1)"	0,3		1
	"Income_tax_workers_(1)"	"Basic_income_tax_rate_workers_(1)"*Inventory."National_income_G$/y"*Labour_market."Worker_share_of_output_(1)"		1
	"Inequality_(1)"	"Owner_operating_income_after_tax_G$/y"/"Worker_income_after_tax_G$/y"		1
	"Inequality_in_1980_(1)"	0,61		1
	"INEQUALITY_INDEX_(1980=1)"	"Inequality_(1)"/"Inequality_in_1980_(1)"		1
	Max_govmnt_debt_burden_y	1		y
	Max_govmnt_debt_G$	Inventory."National_income_G$/y"*Max_govmnt_debt_burden_y		G$
	Max_workers_debt_burden_y	1		y
	Max_workers_debt_G$	"Worker_income_G$/y"*Max_workers_debt_burden_y		G$

	Mult_to_avoid_transient_in_govmnt_finance	0,64		1
	Mult_to_avoid_transient_in_worker_finance	0,39		1
	OCI_in_1980	7081		G$/y
	"Owner_cash_inflow_G$/y"	"Owner_operating_income_after_tax_G$/y"		G$/y
	"Owner_consumptin_fraction_(1)"	1-"Owner_savings_fraction_(1)"		1
	"Owner_consumption_G$/y"	"Permanent_owner_cash_inflow_G$/y"*"Owner_consumptin_fraction_(1)"		G$/y
	"Owner_income_G$/y"	Inventory."National_income_G$/y"*(1-Labour_market."Worker_share_of_output_(1)")		G$/y
	"Owner_operating_income_after_tax_G$/y"	"Owner_income_G$/y"-"Owner_taxes_G$/y"		G$/y
	"Owner_savings_fraction_(1)"	Owner_savings_fraction_in_1980*(1+"sGDPeoOSR<0"*(Population."Effective_GDP_per_person_k$/p/y"/Population."GDP_per_person_in_1980_k$/p/y"-1))		1
	Owner_savings_fraction_in_1980	0,9		1
	"Owner_savings_G$/y"	"Permanent_owner_cash_inflow_G$/y"-"Owner_consumption_G$/y"		G$/y
	"Owner_tax_rate_(1)"	"Owner_taxes_G$/y"/"Owner_income_G$/y"		1
	"Owner_taxes_G$/y"	"Income_tax_owners_(1)"+"Extra_taxes_from_2022_G$/y"*"Fraction_of_extra_taxes_paid_by_owners_(1)"		G$/y
	"Permanent_govmnt_cash_inflow_G$/y"	SMTH1("Govmnt_cash_inflow_G$/y", Time_to_adjust_budget_y, GCI_in_1980)		G$/y
	"Permanent_owner_cash_inflow_G$/y"	SMTH1("Owner_cash_inflow_G$/y", Time_to_adjust_owner_consumption_y, OCI_in_1980)		G$/y
	"Permanent_worker_cash_inflow_G$/y"	SMTH1("Worker_cash_inflow_G$/y", Time_to_adjust_worker_consumption_y, WFI_in_1980)		G$/y
	"Sales_tax_G$/y"	"Sales_tax_workers_G$/y"+"Sales_tax_owners_G$/y"		G$/y
	"Sales_tax_owners_G$/y"	"Owner_consumption_G$/y"*"Sales_tax_rate_(1)"		G$/y
	"Sales_tax_rate_(1)"	0,03		1
	"Sales_tax_workers_G$/y"	"Worker_consumption_demand_G$/y"*"Sales_tax_rate_(1)"		G$/y

	"Savings_share_of_GDP_(1)"	"Total_savings_G$/y"/Inventory."National_income_G$/y"		1
	"sGDPeoOSR<0"	-0,06		1
	Time_to_adjust_budget_y	1		y
	Time_to_adjust_owner_consumption_y	1		y
	Time_to_adjust_worker_consumption_y	1		y
	Time_to_implement_new_taxes_y	5		y
	"Total_purchasing_power_G$/y"	"Worker_cash_inflow_G$/y"+"Govmnt_cash_inflow_G$/y"+"Owner_cash_inflow_G$/y"-"Sales_tax_G$/y"		G$/y
	"Total_savings_G$/y"	"Owner_savings_G$/y"+"Worker_savings_G$/y"		G$/y
	"Transfer_payments_G$/y"	"Govmnt_gross_income_G$/y"*"Fraction_of_govmnt_budget_to_workers_(1)"		G$/y
	WFI_in_1980	13000		G$/y
	"Worker_cash_inflow_G$/y"	"Worker_income_after_tax_G$/y"-"Cash_flow_from_workers_to_banks_G$/y"		G$/y
	"Worker_consumption_demand_G$/y"	"Permanent_worker_cash_inflow_G$/y"*"Worker_consumption_fraction_(1)"		G$/y
	"Worker_consumption_fraction_(1)"	0,9		1
	Worker_debt_burden_y	Workers_debt_G$/"Worker_income_after_tax_G$/y"		y
	"Worker_disposable_income_k$/p/y"	"Permanent_worker_cash_inflow_G$/y"/Labour_market.Workforce_Mp		k$/(p*y)
	"Worker_finance_cost_as_share_of_income_(1)"	"Cash_flow_from_workers_to_banks_G$/y"/"Worker_income_after_tax_G$/y"		1
	"Worker_income_after_tax_G$/y"	"Worker_income_G$/y"-"Worker_taxes_G$/y"+"Transfer_payments_G$/y"		G$/y
	"Worker_income_G$/y"	Inventory."National_income_G$/y"*Labour_market."Worker_share_of_output_(1)"		G$/y
	"Worker_interest_cost_G$/y"	Workers_debt_G$*Finance."Worker_borrowing_cost_1/y"		G$/y

	"Worker_savings_G$/y"	"Permanent_worker_cash_inflow_G$/y"-"Worker_consumption_demand_G$/y"		G$/y
	"Worker_tax_rate_(1)"	"Worker_taxes_G$/y"/"Worker_income_G$/y"		1
	"Worker_taxes_G$/y"	"Income_tax_workers_(1)"+"Extra_taxes_from_2022_G$/y"*(1-"Fraction_of_extra_taxes_paid_by_owners_(1)")		G$/y
	Workers_debt_in_1980_G$	18992*Mult_to_avoid_transient_in_worker_finance		G$
	Workers_drawdown_period_y	10		1
	Workers_payback_period_y	20		y
	Energy:			
	Accumulated_sun_and_wind_capacity_from_1980_GW(t)	Accumulated_sun_and_wind_capacity_from_1980_GW(t - dt) + ("Addition_of_sun_and_wind_capacity_GW/y") * dt	INIT Accumulated_sun_and_wind_capacity_from_1980_GW = Sun_and_wind_capacity_in_1980_GW	Gha
	"Extra_energy_productivity_index_2022=1"(t)	"Extra_energy_productivity_index_2022=1"(t - dt) + ("Increase_in_extra_energy_productivity_index_1/y") * dt	INIT "Extra_energy_productivity_index_2022=1" = "Extra_energy_productivity_index_in_2022_(1)"	1
	Fossil_electricity_capacity_GW(t)	Fossil_electricity_capacity_GW(t - dt) + ("Addition_of_fossil_el_capacity_GW/y" - "Discard_of_fossil_el_capacity_GW/y") * dt	INIT Fossil_electricity_capacity_GW = Fossil_el_capacity_in_1980_GW	GW
	Renewable_electricity_capacity_GW(t)	Renewable_electricity_capacity_GW(t - dt) + ("Addition_of_renewable_el_capacity_GW/y" - "Discard_of_renewable_el_capacity_GW/y") * dt	INIT Renewable_electricity_capacity_GW = Renewable_el_capacity_in_1980_GW	GW
	"Addition_of_fossil_el_capacity_GW/y"	MAX(0, "Desired_fossil_el_capacity_change_GW/y")		GW/Year
	"Addition_of_renewable_el_capacity_GW/y"	MAX(0, (Desired_renewable_el_capacity_change_GW/Renewable_el_construction_time_y)+("Discard_of_renewable_el_capacity_GW/y"))		GW/Year

	"Addition_of_sun_and_wind_capacity_GW/y"	"Addition_of_renewable_el_capacity_GW/y"		Gha/Year
	"Discard_of_fossil_el_capacity_GW/y"	Fossil_electricity_capacity_GW/Life_of_fossil_el_capacity_y		GW/Year
	"Discard_of_renewable_el_capacity_GW/y"	Renewable_electricity_capacity_GW/Life_of_renewable_el_capacity_y		GW/Year
	"Increase_in_extra_energy_productivity_index_1/y"	"Extra_energy_productivity_index_2022=1"*0+STEP("Extra_ROC_in_energy_productivity_after_2022_1/y", 2022)		Per Year
	"4_TWh-el_per_Mtoe"	"TWh-el_per_EJ_-_engineering_equivalent"/"Mtoe_per_EJ_-_calorific_equivalent"		MWh/toe
	"8_khours_per_year"	8		kh/y
	"Adjustment_factor_to_make_costs_match_1980-2022_(1)"	1,35		1
	"Biomass_energy_Mtoe/y"	0		Mtoe/y
	"CAPEX_fossil_el_$/W"	0,7		$/W
	"CAPEX_fossil_el_G$/y"	"CAPEX_fossil_el_$/W"*"Addition_of_fossil_el_capacity_GW/y"		G$/y
	"CAPEX_renewable_el_$/W"	"CAPEX_renewable_el_in_1980_$/W"*"Cost_index_for_sun_and_wind_capacity_(1)"		$/W
	"CAPEX_renewable_el_G$/y"	"CAPEX_renewable_el_$/W"*"Addition_of_renewable_el_capacity_GW/y"		G$/y
	"CAPEX_renewable_el_in_1980_$/W"	7		$/W
	"CO2_emissions_per_person_tCO2/y"	("CO2_from_energy_and_industry_GtCO2/y"/Population.Population_Mp)*1000		tCO2/(p*y)
	"CO2_from_energy_and_industry_GtCO2/y"	"CO2_from_energy_production_GtCO2/y"+"CO2_from_non-fossil_industrial_processes_GtCO2/y"		GtCO2/y
	"CO2_from_energy_production_GtCO2/y"	"Use_of_fossil_fuels_Mtoe/y"*(tCO2_per_toe/1000)*(1-"Fraction_of_CO2-sources_with_CCS_(1)")		GtCO2/y
	"CO2_from_non-fossil_industrial_processes_GtCO2/y"	("Non-fossil_CO2_per_person_tCO2/p/y"/1000)*Population.Population_Mp*(1-"Fraction_of_CO2-sources_with_CCS_(1)")		GtCO2/y
	"Cost_index_for_sun_and_wind_capacity_(1)"	(1-"Cost_reduction_per_doubling_of_sun_and_wind_capacity_(1)")^"Number_of_doublings_in_sun_and_wind_capacity_(1)"		
	"Cost_of_CCS_$/tCO2"	95		$/tCO2

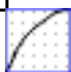
◯	"Cost_of_CCS_G$/y"	"Installed_CCS_capacity_GtCO2/y"*"Cost_of_CCS_$/tCO2"		G$/y
◯	"Cost_of_electricity_G$/y"	"Cost_of_fossil_electricity_G$/y"+"Cost_of_renewable_electricity_G$/y"+"Cost_of_nuclear_electricity_G$/y"		G$/y
◯	"Cost_of_energy_as_share_of_GDP_(1)"	"Cost_of_energy_G$/y"/Inventory."GDP_G$/y"		1
◯	"Cost_of_energy_G$/y"	"Cost_of_fossil_fuel_for_non-el_use_G$/y"+"Cost_of_electricity_G$/y"+"Cost_of_grid_G$/y"+"Cost_of_new_electrification_G$/y"+"Cost_of_CCS_G$/y"+Climate."Cost_of_air_capture_G$/y"		G$/y
◯	"Cost_of_fossil_electricity_G$/y"	"CAPEX_fossil_el_G$/y"+"OPEX_fossil_el_G$/y"		G$/y
◯	"Cost_of_fossil_fuel_for_non-el_use_G$/y"	("Demand_for_fossil_fuel_for_non-el_use_Mtoe/y"*"Traditional_cost_of_fossil_fuel_for_non-el_use_$/toe")/1000		G$/y
◯	"Cost_of_grid_G$/y"	"Electricity_production_TWh/y"*"Transmission_cost_$/kWh"		G$/y
◯	"Cost_of_new_electrification_G$/y"	("Extra_cost_per_reduced_use_of_non-el_FF_$/toe"/1000)*"Extra_reduction_in_demand_for_non-el_fossil_fuel_from_NE_Mtoe/y"		G$/y
◯	"Cost_of_nuclear_el_$/kWh"	0,033		$/kWh
◯	"Cost_of_nuclear_electricity_G$/y"	"Nuclear_electricity_production_TWh/y"*"Cost_of_nuclear_el_$/kWh"		G$/y
◯	"Cost_of_renewable_electricity_G$/y"	"CAPEX_renewable_el_G$/y"+"OPEX_renewable_el_G$/y"		G$/y
◯	"Cost_reduction_per_doubling_of_sun_and_wind_capacity_(1)"	0,2		1
◯	"Demand_for_electricity_before_NE_TWh/y"	(Population.Population_Mp*"Traditional_per_person_use_of_electricity_before_EE_MWh/p/y"*EXP(-"Normal_increase_in_energy_efficiency_1/y"*(TIME-1980)))/"Extra_energy_productivity_index_2022=1"		TWh/y
◯	"Demand_for_electricity_TWh/y"	"Demand_for_electricity_before_NE_TWh/y"+"Extra_increase_in_demand_for_electricity_from_NE_TWh/y"		TWh/y
◯	"Demand_for_fossil_electricity_TWh/y"	MAX(0, "Demand_for_electricity_TWh/y"-"Low-carbon_el_production_TWh/y")		TWh/y

	"Demand_for_fossil_fuel_for_non-el_use_before_NE_Mtoe/y"	(Population.Population_Mp*"Traditional_per_person_use_of_fossil_fuels_for_non-el-use_before_EE_toe/p/y"*EXP(-"Normal_increase_in_energy_efficiency_1/y"*(TIME-1980)))/"Extra_energy_productivity_index_2022=1"		Mtoe/y
	"Demand_for_fossil_fuel_for_non-el_use_Mtoe/y"	"Demand_for_fossil_fuel_for_non-el_use_before_NE_Mtoe/y"-"Extra_reduction_in_demand_for_non-el_fossil_fuel_from_NE_Mtoe/y"		Mtoe/y
	"Desired_fossil_el_capacity_change_GW/y"	(Desired_fossil_el_capacity_GW-Fossil_electricity_capacity_GW)/Fossil_el_cap_construction_time_y+"Discard_of_fossil_el_capacity_GW/y"		GW
	Desired_fossil_el_capacity_GW	"Demand_for_fossil_electricity_TWh/y"/"8_khours_per_year"		GW
	Desired_renewable_el_capacity_change_GW	Desired_renewable_el_capacity_GW-Renewable_electricity_capacity_GW		GW
	Desired_renewable_el_capacity_GW	"Desired_supply_of_renewable_electricity_TWh/y"/"Renewable_capacity_up-time_kh/y"		GW
	"Desired_renewable_electricity_share_(1)"	"Renewable_el_fraction_in_1980_(1)"+RAMP(("Renewable_el_fraction_in_2022_(1)"-"Renewable_el_fraction_in_1980_(1)")/42, 1980, 2022)+RAMP(("Goal_for_renewable_el_fraction_(1)"-"Renewable_el_fraction_in_2022_(1)")/Wellbeing_trust_and_tension.Introduction_period_for_policy_y, 2022, 2022+Wellbeing_trust_and_tension.Introduction_period_for_policy_y)		1
	"Desired_supply_of_renewable_electricity_TWh/y"	"Demand_for_electricity_TWh/y"*"Desired_renewable_electricity_share_(1)"		TWh/y
	"Efficiency_of_fossil_power_plant_TWh-el/TWh-heat"	0,345		1
	"Electricity_balance_(1)"	"Electricity_production_TWh/y"/"Demand_for_electricity_TWh/y"		1
	"Electricity_production_TWh/y"	"Fossil_electricity_production_TWh/y"+"Nuclear_electricity_production_TWh/y"+"Renewable_electricity_production_TWh/y"		TWh/y

	"ENERGY_USE_Mtoe/y"	n-el_use_Mtoe/y"+"Electricity_production_TWh/y"/"4_TWh-el_per_Mtoe"+"Renewable_heat_production_Mtoe/y"		Mtoe/y
	"Energy_use_per_person_toe/p/y"	"ENERGY_USE_Mtoe/y"/Population.Population_Mp		toe/(p*y)
	"Extra_cost_of_Energy_Turnaround_as_share_of_GDP_(1)"	(IF TIME > 2022 THEN ("Cost_of_energy_G$/y"-"Traditional_cost_of_energy_G$/y")/Inventory."GDP_G$/y" ELSE 0)		1
	"Extra_cost_per_reduced_use_of_non-el_FF_$/toe"	10		$/toe
	"Extra_energy_productivity_index_in_2022_(1)"	1		1
	"Extra_increase_in_demand_for_electricity_from_NE_TWh/y"	"Extra_reduction_in_demand_for_non-el_fossil_fuel_from_NE_Mtoe/y"*"Extra_use_of_electricity_per_reduced_use_of_non-el_FF_MWh/toe"		TWh/y
	"Extra_reduction_in_demand_for_non-el_fossil_fuel_from_NE_Mtoe/y"	"Fraction_new_electrification_(1)"*"Demand_for_fossil_fuel_for_non-el_use_before_NE_Mtoe/y"		Mtoe/y
	"Extra_ROC_in_energy_productivity_after_2	0,002		1/y
	"Extra_use_of_electricity_per_reduced_use_of_non-el_FF_MWh/toe"	3		
	"FCUTeoLOFC_(1)"	1+"sFCUTeoLOFC>0"*(("Fossil_capacity_up-time_kh/y"/"8_khours_per_year")-1)		1
	"Fossil_capacity_up-time_kh/y"	"Demand_for_fossil_electricity_TWh/y"/Fossil_electricity_capacity_GW		kh/y
	Fossil_el_cap_construction_time_y	3		
	Fossil_el_capacity_in_1980_GW	980		GW
	"Fossil_electricity_production_TWh/y"	Fossil_electricity_capacity_GW*"Fossil_capacity_up-time_kh/y"		TWh/y
	"Fossil_fuels_for_electricity_Mtoe/y"	"Fossil_electricity_production_TWh/y"/"4_TWh-el_per_Mtoe"		Mtoe/y
	"Fraction_fossil_plus_nuclear_electricity_(1)"	("Fossil_electricity_production_TWh/y"+"Nuclear_electricity_production_TWh/y")/"Electricity_production_TWh/y"		1

◯	"Fraction_new_electrification_(1)"	"Fraction_new_electrification_in_1980_(1)"+RAMP(("Fraction_new_electrification_in_2022_(1)"-"Fraction_new_electrification_in_1980_(1)")/42, 1980, 2022)+RAMP(("Goal_for_fraction_new_electrification_(1)"-"Fraction_new_electrification_in_2022_(1)")/Wellbeing_trust_and_tension.Introduction_period_for_policy_y, 2022, 2022+Wellbeing_trust_and_tension.Introduction_period_for_policy_y)		1
◯	"Fraction_new_electrification_in_1980_(1)"	0		1
◯	"Fraction_new_electrification_in_2022_(1)"	0,03		1
◯	"Fraction_of_CO2-sources_with_CCS_(1)"	"Fraction_of_CO2-sources_with_CCS_in_2022_(1)"+RAMP(("Goal_for_fraction_of_CO2-sources_with_CCS_(1)"-"Fraction_of_CO2-sources_with_CCS_in_2022_(1)")/Wellbeing_trust_and_tension.Introduction_period_for_policy_y, 2022, 2022+Wellbeing_trust_and_tension.Introduction_period_for_policy_y)		
◯	"Fraction_of_CO2-sources_with_CCS_in_2022_(1)"	0		1
◯	"Fraction_of_renewable_electricity_to_hydrogen_(1)"	0		1
◯	"Goal_for_fraction_new_electrification_(1)"	0,5		1
◯	"Goal_for_fraction_of_CO2-	0,2		1
◯	"Goal_for_renewable_el_fraction_(1)"	0,5		1
◯	"Green_hydrogen_MtH2/y"	"Renewable_electricity_production_TWh/y"*"Fraction_of_renewable_electricity_to_hydrogen_(1)"/"kWh-el_per_kgH2"		MtH2/y
◯	"Green_hydrogen_Mtoe/y"	"Green_hydrogen_MtH2/y"*toe_per_tH2		Mtoe/y
◯	"IIASA_Fossil_energy_production_EJ/yr"	"Use_of_fossil_fuels_Mtoe/y"/"Mtoe_per_EJ_-_calorific_equivalent"		EJ/y
◯	"IIASA_Renewable_energy_production_EJ/yr"	"Renewable_electricity_production_TWh/y"/"TWh-el_per_EJ_-_engineering_equivalent"+"Renewable_heat_production_Mtoe/y"/"Mtoe_per_EJ_-_calorific_equivalent"		EJ/y

	"Installed_CCS_capacity_GtCO2/y"	"Fraction_of_CO2-sources_with_CCS_(1)"*("CO2_from_non-fossil_industrial_processes_GtCO2/y"+"CO2_from_energy_production_GtCO2/y")/(1-"Fraction_of_CO2-sources_with_CCS_(1)")		GtCO2/y
	"kWh-el_per_kgH2"	40		kWh/kgH2
	Life_of_fossil_el_capacity_y	Normal_life_of_fossil_el_capacity_y*"FCUTeoLOFC_(1)"		y
	Life_of_renewable_el_capacity_y	40		y
	"Low-carbon_el_production_TWh/y"	"Renewable_electricity_production_TWh/y"+"Nuclear_electricity_production_TWh/y"		TWh/y
	"Max_non-fossil_CO2_per_perso	0,5		tCO2/(p*y)
	"MEMO_Fraction_of_non-el_fossil_fuels_use_in	0,4		1
	"Mtoe_per_EJ_-_calorific_equivalent"	24		Mtoe/EJ
	"Non-fossil_CO2_per_person_tCO2/p/y"	"Max_non-fossil_CO2_per_person_tCO2/p/y"*(1-EXP(-(Population."GDP_per_person_k$/p/y"/10)))		tCO2/(p*y)
	"Normal_increase_in_energy_efficiency_1/y"	0,01		1/y
	Normal_life_of_fossil_el_capacity_y	40		y
	Nuclear_capacity_GW	GRAPH(TIME) Points: (1980.0, 75.0), (2000.0, 310.0), (2020.0, 310.0), (2098.9, 310.0)		GW
	"Nuclear_capacity_up-time_kh/y"	8		h/y
	"Nuclear_electricity_production_TWh/y"	Nuclear_capacity_GW*"Nuclear_capacity_up-time_kh/y"		TWh/y
	"Number_of_doublings_in_sun_and_wind_capacity_(1)"	LN(2)+LN(Accumulated_sun_and_wind_capacity_from_1980_GW/Sun_and_wind_capacity_in_1980_GW)		1
	"OPEX_fossil_el_$/kWh"	0,02		G$/y
	"OPEX_fossil_el_G$/y"	"OPEX_fossil_el_$/kWh"*"Fossil_electricity_production_TWh/y"		G$/y
	"OPEX_renewable_el_$/kWh"	0,001		$/kWh
	"OPEX_renewable_el_G$/y"	"OPEX_renewable_el_$/kWh"*"Renewable_electricity_production_TWh/y"		G$/y
	"Ratio_of_Energy_cost_to_Trad_energy_cost_(1)"	"Cost_of_energy_G$/y"/"Traditional_cost_of_energy_G$/y"		1
	"Renewable_capacity_up-time_kh/y"	3		h/y

	Renewable_el_capacity_in_1980_GW	300		GW
	Renewable_el_construction_time_y	3		
	"Renewable_el_fraction_in_1980_(1)"	0,065		1
	"Renewable_el_fraction_in_2022_(1)"	0,23		1
	"Renewable_electricity_production_TWh/y"	Renewable_electricity_capacity_GW*"Renewable_capacity_up-time_kh/y"		TWh/y
	"Renewable_heat_production_Mtoe/y"	"Biomass_energy_Mtoe/y"+"Green_hydrogen_Mtoe/y"		Mtoe/y
	"ROC_in_tCO2_per_toe_1/y"	-0,003		
	"sFCUTeoLOFC>0"	0,5		1
	Sun_and_wind_capacity_in_1980_GW	10		GW
	tCO2_per_toe	2.8*EXP("ROC_in_tCO2_per_toe_1/y"*(TIME-1980))		tCO2/toe
	toe_per_tH2	10		
	"Traditional_cost_of_electricity_$/kWh"	0,03		$/kWh
	"Traditional_cost_of_electricity_G$/y"	("Demand_for_electricity_before_NE_TWh/y"*"Traditional_cost_of_electricity_$/kWh"/1000)*"Adjustment_factor_to_make_costs_match_1980-2022_(1)"		G$/y
	"Traditional_cost_of_energy_as_share_of_GDP_(1)"	"Traditional_cost_of_energy_G$/y"/Inventory."GDP_G$/y"		1
	"Traditional_cost_of_energy_G$/y"	"Traditional_cost_of_electricity_G$/y"+"Traditional_cost_of_fossil_fuel_for_non-el_use_G$/y"+"Traditional_grid_cost_G$/y"		G$/y
	"Traditional_cost_of_fossil_fuel_for_non-	240		$/toe
	"Traditional_cost_of_fossil_fuel_for_non-el_use_G$/y"	("Demand_for_fossil_fuel_for_non-el_use_before_NE_Mtoe/y"*"Traditional_cost_of_fossil_fuel_for_non-el_use_$/toe"/1000)*"Adjustment_factor_to_make_costs_match_1980-2022_(1)"		G$/y
	"Traditional_grid_cost_G$/y"	"Demand_for_electricity_before_NE_TWh/y"*"Transmission_cost_$/kWh"		G$/y
	"Traditional_per_person_use_of_electricity_before_EE_MWh/p/y"	GRAPH(Population."GDP_per_person_k$/p/y") Points: (0.00, 0.00), (10.00, 4.00), (20.00,		MWh/(p*y)
	"Traditional_per_person_use_of_fossil_fuels_for_non-el-use_before_EE_toe/p/	GRAPH(Population."GDP_per_person_k$/p/y") Points: (0.00, 0.300), (15.00, 2.000), (25.00, 3.100), (35.00, 4.000), (50.00,		t/(p*y)
	"Transmission_cost_$/kWh"	0,02		$/kWh

	"TWh-el_per_EJ_-_engineering_equivalent"	"TWh-heat_per_EJ_-_calorific_equivalent"*"Efficiency_of_fossil_power_plant_TWh-el/TWh-heat"		TWh/EJ
	"TWh-heat_per_EJ_-_calorific_equivalent"	278		TWh/EJ
	"Use_of_fossil_fuels_Mtoe/y"	n-el_use_Mtoe/y"+"Fossil_fuels_for_electricity_Mtoe/y"		Mtoe/y
	Finance:			
	"Central_bank_signal_rate_1/y"(t)	"Central_bank_signal_rate_1/y"(t - dt) + ("Change_in_signal_rate_1/yy") * dt	INIT "Central_bank_signal_rate_1/y" = "Normal_signal_rate_1/y"	1/y
	"Change_in_signal_rate_1/yy"	("Indicated_signal_rate_1/y"-"Central_bank_signal_rate_1/y")/Signal_rate_adjustment_time_y		1/y/Year
	"10-yr_govmnt_interest_rate_1/y"	"Govmnt_borrowing_cost_1/y"+"Expected_long_term_inflation_1/y"		1/y
	"3m_interest_rate_1/y"	"Central_bank_signal_rate_1/y"+"Normal_basic_bank_margin_1/y"		1/y
	"Corporate_borrowing_cost_1/y"	"Cost_of_capital_for_secured_debt_1/y"+"Normal_corporate_credit_risk_1/y"		1/y
	"Corporate_borrowing_cost_in_1980_1/y"	"Normal_signal_rate_1/y"+"Normal_basic_bank_margin_1/y"+"Normal_bank_operating_margin_1/y"+"Normal_corporate_credit_risk_1/y"		1/y
	"Cost_of_capital_for_secured_debt_1/y"	SMTH1("3m_interest_rate_1/y"+"Normal_bank_operating_margin_1/y", Finance_sector_response_time_y, "3m_interest_rate_1/y"+"Normal_bank_operating_margin_1/y")		1/y
	"Expected_long_term_inflation_1/y"	SMTH1("Perceived_inflation_CB_1/y", Inflation_expectation_formation_time_y, "Inflation_in_1980_(1/y)")		1/y
	Finance_sector_response_time_y	1		y
	"Govmnt_borrowing_cost_1/y"	"3m_interest_rate_1/y"		1/y
	"Indicated_signal_rate_1/y"	"Normal_signal_rate_1/y"*(1+"sINeoSR>0"*("Perceived_inflation_CB_1/y"/"Inflation_target_1/y"-1)+"sUNeoSR<0"*("Perceived_unemployment_CB_(1)"/"Unemployment_target_(1)"-1))		1/y

	Inflation_expectation_formation_time_y	10		y
	"Inflation_in_1980_(1/y)"	0,02		1/y
	Inflation_perception_time_CB_y	1		y
	"Inflation_target_1/y"	0,02		1/y
	"Normal_bank_operating_margin_1/y"	0,015		1/y
	"Normal_basic_bank_margin_1/y"	0,005		1/y
	"Normal_corporate_credit_risk_1/y"	0.02*(1+"sGReoCR<0"*(Output."Output_growth_rate_1/y"/0.03-1))		1/y
	"Normal_signal_rate_1/y"	0,02		1/y
	"Perceived_inflation_CB_1/y"	SMTH1(Inventory."Inflation_rate_1/y", Inflation_perception_time_CB_y, "Inflation_in_1980_(1/y)")		1/y
	"Perceived_unemployment_CB_(1)"	SMTH1(Labour_market."Unemployment_rate_(1)", Unemployment_perception_time_CB_y)		1
	"sGReoCR<0"	0		1
	Signal_rate_adjustment_time_y	1		1
	"sINeoSR>0"	0,7		1
	"sUNeoSR<0"	-1,5		1/yy
	Unemployment_perception_time_CB_y	1		y
	"Unemployment_target_(1)"	0,05		1
	"Worker_borrowing_cost_1/y"	"Cost_of_capital_for_secured_debt_1/y"		1/y
	Food_and_land_use:			
	Barren_land_Mha(t)	Barren_land_Mha(t - dt) + ("Cropland_loss_Mha/y") * dt	INIT Barren_land_Mha = 3000	Mha
	Cropland_Mha(t)	Cropland_Mha(t - dt) + ("Cropland_expansion_Mha/y" - "Cropland_loss_Mha/y" - "Urban_expansion_Mha/y") * dt	INIT Cropland_Mha = Cropland_in_1980_Mha	Mha
	Forestry_land_Mha(t)	Forestry_land_Mha(t - dt) + ("New_forestry_land_Mha/y" - "Cropland_expansion_Mha/y") * dt	INIT Forestry_land_Mha = Forestry_land_in_1980_Mha	Mha
	Grazing_land_Mha(t)	Grazing_land_Mha(t - dt) + ("New_grazing_land_Mha/y") * dt	INIT Grazing_land_Mha = Grazing_land_in_1980_Mha	Mha

	Old_growth_forest_area_Mha_1(t)	Old_growth_forest_area_Mha_1(t - dt) + (- "New_forestry_land_Mha/y" - "New_grazing_land_Mha/y") * dt	INIT Old_growth_forest_area_Mha_1 = Old_growth_forest_in_1980_Mha	Mha
	"Soil_quality_index_in_conv_ag_(1980=1)"(t)	"Soil_quality_index_in_conv_ag_(1980=1)"(t - dt) + ("Change_in_soil_quality_in_conv_ag_t-crop/ha/y/y") * dt	INIT "Soil_quality_index_in_conv_ag_(1980=1)" = "Soil_quality_index_in_1980_(1)"	t/(ha*y)
	Urban_land_Mha(t)	Urban_land_Mha(t - dt) + ("Urban_expansion_Mha/y") * dt	INIT Urban_land_Mha = Urban_land_in_1980_Mha	Mha
	"Change_in_soil_quality_in_conv_ag_t-crop/ha/y/y"	"ROC_in_soil_quality_in_conv_ag_1/y"*"Soil_quality_index_in_conv_ag_(1980=1)"		t/(ha*y)/Year
	"Cropland_expansion_Mha/y"	(IF Forestry_land_Mha > 0 THEN Cropland_Mha*"Cropland_expansion_rate_1/y" ELSE 0)*"Acceptable_loss_of_forestry_land_(1)"*"Cropland_expansion_multiplier_(1)"		Mha/Year
	"Cropland_loss_Mha/y"	Cropland_Mha*"Land_erosion_rate_1/y"		Mha/Year
	"New_forestry_land_Mha/y"	"Old_growth_removal_Mha/y"*(1-"Fraction_cleared_for_grazing_(1)")		Mha/Year
	"New_grazing_land_Mha/y"	"Old_growth_removal_Mha/y"*"Fraction_cleared_for_grazing_(1)"		Mha/Year
	"Urban_expansion_Mha/y"	MAX(0, (Indicated_urban_land_Mha-Urban_land_Mha)/Urban_development_time_y)		Mha/Year
	"Acceptable_loss_of_forestry_land_(1)"	1-EXP(-"Fraction_forestry_land_remaining_(1)"/"Threshold_FFLR_(1)")		1
	"Agriculture_as_fraction_of_GDP_(1)"	0,05		
	"Amount_of_fertilizer_saved_in_reg_ag_kgN/ha/y"	268-"Sustainable_fertiliser_use_kgN/ha/y"		kg/(ha*y)
	"Average_crop_yield_t-crop/ha/y"	("Desired_crop_yield_in_conv_ag_t-crop/ha/y"*(1-"Fraction_regenerative_agriculture_(1)")*"Soil_quality_index_in_conv_ag_(1980=1)"+"Crop_yield_in_reg_ag_t-crop/ha/y"*"Fraction_regenerative_agriculture_(1)")*"CO2_effect_on_land_yield_(1)"*"Warming_effect_on_land_yield_(1)"		t/(ha*y)
	"Biofuels_use_Mtoe/y"	GRAPH(TIME) Points: (1980.0, 0.000), (1990.0, 0.000), (2000.0, 0.000), (2020.0, 0.000), (2100.0, 0.000)		Mt/y

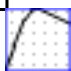
◯	"CO2_absorbed_in_reg_ag_tCO2/ha/y"	1		
◯	"CO2_absorption_in_forestry_land_GtCO2/y"	Forestry_land_Mha*("CO2_absorption_in_forestry_land_tCO2/ha/y"/1000)*"CO2_effect_on_land_yield_(1)"*"Warming_effect_on_land_yield_(1)"		GtCO2/y
◯	"CO2_absorption_in_forestry_land_tCO2/ha/	1.6*"Forest_absorption_multipler_(1)"		t/(ha*y)
◯	"CO2_effect_on_land_yield_(1)"	(IF TIME > 2022 THEN 1+"sCO2CeoACY>0"*(Climate.CO2_concentration_in_atm_ppm/ Climate.CO2_concentration_in_2022_ppm-1) ELSE 1)		1
◯	"CO2_emissions_from_LULUC_GtCO2/y"	"CO2_release_from_forest_cut_GtCO2/y"-"CO2_absorption_in_forestry_land_GtCO2/y"-"Extra_CO2_absorption_in_reg_ag_GtCO2/y"		
◯	"CO2_release_from_forest_cut_GtCO2/y"	(("Old_growth_removal_Mha/y"+"Cropland_expansion_Mha/y")*"CO2_release_per_ha_of_forest_cut_tCO2/ha")/1000		GtCO2/y
◯	"CO2_release_per_ha_of_forest_cut_tCO2/h	65		t/ha
◯	"Cost_index_for_Regenerative_agriculture_(1)"	(1-"Cost_reduction_per_doubling_in_Regenerative_agriculture_(1)")^"Number_of_doublings_in_reg_ag_(1)"		
◯	"Cost_of_fertilizer_G$/y"	"Fertilizer_use_Mt/y"*"Cost_per_ton_fertilizer_$/t"/1000		G$/y
◯	"Cost_of_food_and_energy_as_share_of_GDP_(1)"	"Cost_of_food_and_energy_G$/y"/Inventory."GDP_G$/y"		1
◯	"Cost_of_food_and_energy_G$/y"	"Cost_of_food_G$/y"+Energy."Cost_of_energy_G$/y"		G$/y
◯	"Cost_of_food_G$/y"	"Agriculture_as_fraction_of_GDP_(1)"*Inventory."GDP_G$/y"+"Cost_of_regenerative_agriculture_G$/y"+"Cost_of_fertilizer_G$/y"		G$/y
◯	"Cost_of_regenerative_agriculture_G$/y"	("Extra_cost_of_reg_ag_$/ha/y"*Regenerative_agriculture_area_Mha)/1000		G$/y
◯	"Cost_per_ton_fertilizer_$/t"	500		$/t
◯	"Cost_reduction_per_doubling_in_Regenerative_agriculture_(1)"	0,05		1
◯	"Crop_balance_(1)"	"Crop_use_Mt/y"/"Desired_crop_supply_Mt-crop/y"		1
◯	"Crop_demand_Mt-crop/y"	("Traditional_use_of_crops_ex_red_meat_Mt/y"+"Feed_for_red_meat_Mt-crop/y"+"Crops_for_biofuel_Mt-crop/y")		Mt/y

	"Crop_supply_(after_20_%_waste)_Mt-crop/y"	"Average_crop_yield_t-crop/ha/y"*Cropland_Mha		Mt/y
	"Crop_supply_reg_ag_Mt-crop/y"	"Crop_yield_in_reg_ag_t-crop/ha/y"*Cropland_Mha*"Fraction_regenerative_agriculture_(1)"		Mt/y
	"Crop_use_Mt/y"	"Crop_supply_(after_20_%_waste)_Mt-crop/y"*(1+"Crop_waste_reduction_(1)")		Mt/y
	"Crop_use_per_person_t-crop/p/y"	"Crop_use_Mt/y"/Population.Population_Mp		t/(p*y)
	"Crop_waste_reduction_(1)"	RAMP("Goal_for_crop_waste_reduction_(1)"/Wellbeing_trust_and_tension.Introduction_period_for_policy_y, 2022, 2022+Wellbeing_trust_and_tension.Introduction_period_for_policy_y)		1
	"Crop_yield_in_reg_ag_t-crop/ha/y"	5		t/(ha*y)
	"Cropland_expansion_multiplier_(1)"	(IF TIME > 2022 THEN 1-"SSP2_land_management_action_from_2022?_(1)"*RAMP((1-0)/78, 2022, 2100) ELSE 1)		
	"Cropland_expansion_rate_1/y"	1/200+"sFBeoCLE<0"*("Perceived_crop_balance_(1)"-1)		1/y
	Cropland_in_1980_Mha	1450		Mha
	"Crops_for_biofuel_Mt-crop/y"	"Biofuels_use_Mtoe/y"*Ton_crops_per_toe_biofuel		Mt/y
	"Demand_for_red_meat_Mt-red-meat/y"	((Population.Population_Mp*"Demand_for_red_meat_per_person_kg-red-meat/p/y")/1000)*(1-"Fraction_new_red_meat_(1)")		Mt/y
	"Demand_for_red_meat_per_person_kg-red-meat/p/y"	"Traditional_use_of_red_meat_per_person_kg-red-meat/p/y"		kg/(p*y)
	"Desired_crop_supply_conv_ag_Mt-crop/y"	"Desired_crop_supply_Mt-crop/y"-"Crop_supply_reg_ag_Mt-crop/y"		Mt/y
	"Desired_crop_supply_Mt-crop/y"	"Crop_demand_Mt-crop/y"		Mt/y
	"Desired_crop_yield_in_conv_ag_t-crop/ha/y"	"Desired_crop_supply_conv_ag_Mt-crop/y"/(Cropland_Mha*(1-"Fraction_regenerative_agriculture_(1)"))		t/(ha*y)
	"Desired_reserve_capacity_(1)"	0,05		1
	Experience_gained_before_2022_Mha	5		Mha
	"Extra_CO2_absorption_in_reg_ag_GtCO2/y"	Regenerative_agriculture_area_Mha*"CO2_absorbed_in_reg_ag_tCO2/ha/y"/1000		GtCO2/y
	"Extra_cost_of_Food_Turnaround_as_share_of_GDP_(1)"	"Extra_cost_of_Food_Turnaround_G$/y"/Inventory."GDP_G$/y"		1

	"Extra_cost_of_Food_Turnaround_G$/y"	"Cost_of_regenerative_agriculture_G$/y"-"Fertilizer_cost_reduction_G$/y"		G$/y
	"Extra_cost_of_reg_ag_$/ha/y"	"Extra_cost_of_reg_ag_in_2022_$/ha/y"*"Cost_index_for_Regenerative_agriculture_(1)"		$/(ha*y)
	"Extra_cost_of_reg_ag_in_2022_$/ha/y"	400		$/(ha*y)
	"Extra_ROC_in_food_sector_productivity_from_2022_1/y"	0		
	"Feed_for_red_meat_Mt-crop/y"	"Red_meat_from_feedlots_Mt-red-meat/y"*"kg-crop_per_kg-red-meat"		Mt/y
	"Fertilizer_cost_reduction_G$/y"	("Amount_of_fertilizer_saved_in_reg_ag_kgN/ha/y"/1000)*Regenerative_agriculture_area_Mha*("Cost_per_ton_fertilizer_$/t")		G$/y
	"Fertilizer_effect_on_erosion_rate_(1)"	1+"sFUeoLER>0"*("Fertilizer_use_in_conv_ag_kgN/ha/y"/"Sustainable_fertiliser_use_kgN/ha/y"-1)		1
	"Fertilizer_productivity_index_(1980=1)"	EXP("ROC_in_fertilizer_productivity_1/y"*(TIME-1980))		1
	"Fertilizer_use_in_1980_Mt/y"	61		Mt/y
	"Fertilizer_use_in_conv_ag_kgN/ha/y"	"Traditional_fertilizer_use_in_conv_ag_kgN/ha/y"/"Fertilizer_productivity_index_(1980=1)"		kgN/(ha*y)
	"Fertilizer_use_Mt/y"	Cropland_Mha*(1-"Fraction_regenerative_agriculture_(1)")*"Fertilizer_use_in_conv_ag_kgN/ha/y"/1000		Mt/y
	"Fertilizer_use_per_person_kg/p/y"	("Fertilizer_use_Mt/y"/Population.Population_Mp)*1000		kg/(p*y)
	FFLReoOGRR	MAX(1, 1+"sFFLReoOGRR<0"*("Fraction_forestry_land_remaining_(1)"-"Threshold_FFLR_(1)"))		1
	Food_footprint	Cropland_Mha*"Fertilizer_use_Mt/y"		Mha*Mt/y
	Food_footprint_in_1980	Cropland_in_1980_Mha*"Fertilizer_use_in_1980_Mt/y"		Mha*Mt/y
	"FOOD_FOOTPRINT_INDEX_(1980=1)"	Food_footprint/Food_footprint_in_1980		1
	"Food_sector_productivity_index_(1980=1)"	EXP("ROC_in_food_sector_productivity_1/y"*(TIME-1980))*(IF TIME > 2022 THEN EXP("Extra_ROC_in_food_sector_productivity_from_2022_1/y"*(TIME-2022)) ELSE 1)		
	"Forest_absorption_multipler_(1)"	(IF TIME > 2022 THEN 1+"SSP2_land_management_action_from_2022?_(1)"*RAMP(("Max_forest_absorption_multiplier_(1)"-1)/78, 2022, 2100) ELSE 1)		

	Forestry_land_in_1980_Mha	1100		Mha
	"Fraction_cleared_for_grazing_(1)"	0,1		1
	"Fraction_forestry_land_remaining_(1)"	MAX(0, Forestry_land_Mha/Forestry_land_in_1980_Mha)		1
	"Fraction_new_red_meat_(1)"	RAMP("Goal_for_fraction_new_red_meat_(1)"/Wellbeing_trust_and_tension.Introduction_period_for_policy_y, 2022, 2022+Wellbeing_trust_and_tension.Introduction_period_for_policy_y)		1
	"Fraction_regenerative_agriculture_(1)"	RAMP("Goal_for_fraction_regenerative_agriculture_(1)"/Wellbeing_trust_and_tension.Introduction_period_for_policy_y, 2022, 2020+Wellbeing_trust_and_tension.Introduction_period_for_policy_y)		1
	"Goal_for_crop_waste_reduction_(1)"	0,05		1
	"Goal_for_fraction_new_red_meat_(1)"	0,1		1
	"Goal_for_fraction_regenerative_agriculture_(1)"	0,1		1
	Grazing_land_in_1980_Mha	3300		Mha
	"Grazing_land_yied_in_1980_kg-red-meat/ha/y"	14*"CO2_effect_on_land_yield_(1)"*"Warming_effect_on_land_yield_(1)"		1
	"Grazing_land_yield_kg-red-meat/ha/y"	"Grazing_land_yied_in_1980_kg-red-meat/ha/y"+0*Climate.CO2_concentration_in_atm_ppm-0*Climate.Observed_warming_deg_C		kg/(ha*y)
	Indicated_urban_land_Mha	Population.Population_Mp*"Urban_land_per_population_ha/p"		Mha
	"kg-crop_per_kg-red-meat"	24		1
	"Land_erosion_multiplier_(1)"	(IF TIME > 2022 THEN 1-"SSP2_land_management_action_from_2022?_(1)"*RAMP((1-0)/78, 2022, 2100) ELSE 1)		1
	"Land_erosion_rate_1/y"	"Land_erosion_rate_in_1980_1/y"*"Fertilizer_effect_on_erosion_rate_(1)"*"Land_erosion_multiplier_(1)"		1/y
	"Land_erosion_rate_in_1980_1/y"	0,004		1
	"Loss_of_cropland_Mha/y"	"Cropland_loss_Mha/y"+"Urban_expansion_Mha/y"		Mha/y
	"Loss_of_forest_land_Mha/y"	"Old_growth_removal_Mha/y"+"Cropland_expansion_Mha/y"		Mha/y

	"Max_forest_absorption_multiplier_(1)"	2		1
	"Number_of_doublings_in_reg_ag_(1)"	LN((Regenerative_agriculture_area_Mha+Experience_gained_before_2022_Mha)/Experience_gained_before_2022_Mha)/0.693		1
	"OGRR_in_1980_1/y"	0,004		1/y
	Old_growth_forest_in_1980_Mha	2600		Mha
	"Old_growth_removal_Mha/y"	Old_growth_forest_area_Mha_1*"Old_growth_removal_rate_1/y"*"Old_growth_removal_rate_multiplier_(1)"		Mha/y
	"Old_growth_removal_rate_1/y"	"OGRR_in_1980_1/y"*FFLReoOGRR		1/y
	"Old_growth_removal_rate_multiplier_(1)"	(IF TIME > 2022 THEN 1-"SSP2_land_management_action_from_2022?_(1)"*RAMP((1-0)/78, 2022, 2100) ELSE 1)		
	"Perceived_crop_balance_(1)"	"Crop_balance_(1)"/(1+"Desired_reserve_capacity_(1)")		1
	"Potential_red_meat_from_grazing_land_Mt-red-meat/y"	Grazing_land_Mha*"Grazing_land_yield_kg-red-meat/ha/y"/1000		Mt/y
	"Red_meat_from_feedlots_Mt-red-meat/y"	"Demand_for_red_meat_Mt-red-meat/y"-"Red_meat_from_grazing_land_Mt-red-meat/y"		Mt/y
	"Red_meat_from_grazing_land_Mt-red-meat/y"	MIN("Demand_for_red_meat_Mt-red-meat/y", "Potential_red_meat_from_grazing_land_Mt-red-meat/y")		Mt/y
	"Red_meat_supply_per_person_kg-red-meat/p/y"	("Red_meat_from_grazing_land_Mt-red-meat/y"+"Red_meat_from_feedlots_Mt-red-meat/y"*MIN(1, "Crop_balance_(1)"))*1000/Population.Population_Mp		kg/(p*y)
	Regenerative_agriculture_area_Mha	Cropland_Mha*"Fraction_regenerative_agriculture_(1)"		Mha
	"ROC_in_fertilizer_productivity_1/y"	0,01		1/y
	"ROC_in_food_sector_productivity_1/y"	0,002		1/y
	"ROC_in_soil_quality_in_conv_ag_1/y"	0+"sFUeoSQ<0"*("Fertilizer_use_in_conv_ag_kgN/ha/y"/"Sustainable_fertiliser_use_kgN/ha/y"-1)		1/y
	"sCO2CeoACY>0"	0,3		1
	"sFBeoCLE<0"	-0,03		1
	"sFFLReoOGRR<0"	-5		1
	"sFUeoLER>0"	0,02		1
	"sFUeoSQ<0"	-0,001		1
	"Soil_quality_index_in_1980_(1)"	1		t/(ha*y)
	"sOWeoACY<0"	-0,3		1

	"SSP2_land_management_action_from_2022?_(1)"	1		1
	"Sustainable_fertiliser_use_kgN/ha/y"	20		kgN/(ha*y)
	"Threshold_FFLR_(1)"	0,2		1
	Ton_crops_per_toe_biofuel	0		t/toe
	Total_forest_area_Mha	Old_growth_forest_area_Mha_1+Forestry_land_Mha		Mha
	"Traditional_fertilizer_use_in_conv_ag_kgN/ha/y"	GRAPH("Desired_crop_yield_in_conv_ag_t-crop/ha/y") Points: (1.000, 0.0), (2.000, 40.0), (2.500, 50.0), (3.000, 60.0), (3.500, 70.0), (4.500, 100.0), (6.500, 200.0), (10.000, 600.0)		
	"Traditional_use_of_crops_ex_red_meat_Mt/y"	("Traditional_use_of_crops_Mt/y"-"Traditional_use_of_feed_for_red_meat_Mt-crop/y")/"Food_sector_productivity_index_(1980=1)"		Mt/y
	"Traditional_use_of_crops_ex_red_meat_per_person_kg-crop/p/y"	"Traditional_use_of_crops_ex_red_meat_Mt/y"*1000/Population.Population_Mp		kg/(p*y)
	"Traditional_use_of_crops_Mt/y"	"Traditional_use_of_crops_per_person_kg-crop/p/y"*Population.Population_Mp/1000		
	"Traditional_use_of_crops_per_person_kg-crop/p/y"	GRAPH(Population."GDP_per_person_k$/p/y") Points: (0.0, 400), (6.1, 680), (8.7, 780), (13.9, 950), (20.0, 1050), (30.0, 1150), (40.0, 1250), (60.0, 1350), (100.0, 1550)		kg/(p*y)
	"Traditional_use_of_feed_for_red_meat_Mt-crop/y"	((("Traditional_use_of_red_meat_per_person_kg-red-meat/p/y"/1000)*Population.Population_Mp)-"Red_meat_from_grazing_land_Mt-red-meat/y")*"kg-crop_per_kg-red-meat"		Mt/y
	"Traditional_use_of_red_meat_per_person_kg-red-meat/p/y"	GRAPH(Population."GDP_per_person_k$/p/y") Points: (0.0, 0.00), (6.1, 6.00), (8.8, 8.50), (14.0, 13.00), (30.0, 27.00), (40.0, 32.00), (50.0, 33.00), (100.0, 25.00)		
	Urban_development_time_y	10		y
	Urban_land_in_1980_Mha	215		Mha
	"Urban_land_per_population_ha/p"	0,05		1

	"Warming_effect_on_land_yield_(1)"	(IF TIME > 2022 THEN 1+"sOWeoACY<0"*(Climate.Observed_warming_deg_C/Climate.Observed_warming_in_2022_deg_C-1) ELSE 1)		1
	Inventory:			
	"Delivery_delay_-_index_(1)"(t)	"Delivery_delay_-_index_(1)"(t - dt) + ("Change_in_DDI_1/y") * dt	INIT "Delivery_delay_-_index_(1)" = 1	1
	Inventory_Gu(t)	Inventory_Gu(t - dt) + ("Output_Gu/y" - "Deliveries_Gu/y") * dt	INIT Inventory_Gu = INV_in_1980_Gu	Gu
	"Price_Index_(1980=1)"(t)	"Price_Index_(1980=1)"(t - dt) + ("Change_in_Price_Index_1/y") * dt	INIT "Price_Index_(1980=1)" = "Price_Index_in_1980_(=1)"	dmnl
	"Change_in_DDI_1/y"	"ROC_in_DDI_1/y"*"Delivery_delay_-_index_(1)"		Per Year
	"Change_in_Price_Index_1/y"	"Price_Index_(1980=1)"*"Inflation_rate_1/y"		Per Year
	"Deliveries_Gu/y"	(("Effective_purchasing_power_G$/y"/Output."Price_per_unit_$/u")/("Delivery_delay_-_index_(1)"/DDI_in_1980_y))*(IF TIME > 1984 THEN 1 ELSE 1)		Gu/Year
	"Output_Gu/y"	Output."Optimal_real_output_Gu/y"*"Shifts_worked_-_index_(1)"/"SWI_in_1980_(1)"		Gu/Year
	DDI_in_1980_y	1		y
	Demand_adjustment_time_y	1,2		y
	"Demand_in_1980_G$/y"	Output."Optimal_output_in_1980_Gu/y"*Output."Price_per_unit_$/u"*"SWI_in_1980_(1)"		G$/y
	"Demand_pulse_2020-25_(1)"	0+"Pulse_height_(1)"*(IF TIME >= (2020) AND TIME < ((2020) + MAX(DT,5)) THEN 1 ELSE 0)		1
	Desired_inventory_coverage_y	0,4		y
	"Desired_relative_inventory_(1)"	1		1
	"Desired_shifts_worked_-_index_(1)"	1+"sINVeoSWI<0"*("Perceived_relative_inventory_(1)"/"Desired_relative_inventory_(1)"-1)		1
	"Effective_purchasing_power_G$/y"	SMTH1(Demand."Total_purchasing_power_G$/y", Demand_adjustment_time_y, "Demand_in_1980_G$/y")*(1+"Demand_pulse_2020-25_(1)")		G$/y
	"GDP_G$/y"	"Output_Gu/y"*Output."Price_per_unit_$/u"		G$/y

	"Inflation_rate_1/y"	"sINVeoIN<0"*("Perceived_relative_inventory_(1)"/"Minimum_relative_inventory_without_inflation_(1)"-1)		1/y
	INV_in_1980_Gu	Output."Optimal_output_in_1980_Gu/y"*"SWI_in_1980_(1)"*Desired_inventory_coverage_y		Gu
	Inventory_coverage_perception_time_y	0,25		y
	Inventory_coverage_y	Inventory_Gu/"Recent_sales_Gu/y"		y
	"Minimum_relative_inventory_without_inflation_(1)"	1,07		1
	"National_income_G$/y"	"Sales_G$/y"		G$/y
	"Perceived_relative_inventory_(1)"	SMTH1(Inventory_coverage_y/Desired_inventory_coverage_y, Inventory_coverage_perception_time_y)		1
	"Price_Index_in_1980_(=1)"	1		1
	"Pulse_height_(1)"	0		1
	"Recent_sales_Gu/y"	SMTH1("Deliveries_Gu/y", Sales_averaging_time_y, "Demand_in_1980_G$/y")		Gu/y
	"ROC_in_DDI_1/y"	0+"sINVeoDDI<0"*("Perceived_relative_inventory_(1)"/"Sufficient_relative_inventory_(1)"-1)		1/y
	Sales_averaging_time_y	1		y
	"Sales_G$/y"	"Deliveries_Gu/y"*Output."Price_per_unit_$/u"		
	"Shifts_worked_-_index_(1)"	SMTH1("Desired_shifts_worked_-_index_(1)", Time_to_adjust_shifts_y)		1
	"sINVeoDDI<0"	-0,6		1
	"sINVeoIN<0"	-0,26		1
	"sINVeoSWI<0"	-0,6		1
	"Sufficient_relative_inventory_(1)"	1		1
	"SWI_in_1980_(1)"	1		1
	Time_to_adjust_shifts_y	0,24		y
	Labour_market:			
	"Embedded_CLR_kcu/ftj"(t)	"Embedded_CLR_kcu/ftj"(t - dt) + ("Change_in_embedded_CLR_kcu/ftj/y") * dt	INIT "Embedded_CLR_kcu/ftj" = "CLR_in_1980_kcu/ftj"	kcu/ftj
	"Wage_rate_$/ph"(t)	"Wage_rate_$/ph"(t - dt) + ("Change_in_wage_rate_$/ph/y" - "Wage_rate_erosion_$/ph/y") * dt	INIT "Wage_rate_$/ph" = "Wage_rate_in_1980_$/ph"	$/ph

	"Worker_share_of_output_(1)"(t)	"Worker_share_of_output_(1)"(t - dt) + ("Change_in_wso_1/y" - "Long-term_erosion_of_wso_1/y") * dt	INIT "Worker_share_of_output_(1)" = "WSO_in_1980_(1)"	1
	Workforce_Mp(t)	Workforce_Mp(t - dt) + ("Change_in_workforce_Mp/y") * dt	INIT Workforce_Mp = Workforce_in_1980_Mp	Mp
	"Change_in_embedded_CLR_kcu/ftj/y"	"ROC_in_ECLR_1/y"*"Embedded_CLR_kcu/ftj"		kcu/ftj/Year
	"Change_in_wage_rate_$/ph/y"	"Wage_rate_$/ph"*"ROC_in_WSO_-_Table_1/y"		$/ph/Year
	"Change_in_workforce_Mp/y"	(Optimal_workforce_Mp-Workforce_Mp)/"Hiring/firing_delay_y"		Mp/Year
	"Change_in_wso_1/y"	"Worker_share_of_output_(1)"*"ROC_in_WSO_-_Table_1/y"		Per Year
	"Long-term_erosion_of_wso_1/y"	"Worker_share_of_output_(1)"*"Real_wage_erosion_rate_1/y"		Per Year
	"Wage_rate_erosion_$/ph/y"	"Wage_rate_$/ph"*"Wage_rate_erosion_rate_1/y"		$/ph/Year
	"10-yr_loop_delay_y"	2,3		y
	"Acceptable_unemployment_rate_(1)"	0,05		1
	Available_workforce_Mp	Working_age_population_Mp*"Labour_participation_rate_(1)"		Mp
	"Average_gross_income_per_worker_k$/p/y"	"Wage_rate_$/ph"*"Average_hours_worked_kh/y"		k$/(p*y)
	"Average_hours_worked_in_1980_kh/y"	"Normal_hours_worked_in_1980_kh/ftj/y"/"Persons_per_full-time_job_in_1980_p/ftj"		kh/y
	"Average_hours_worked_kh/y"	"Normal_hours_worked_kh/ftj/y"/"Persons_per_full-time_job_p/ftj"		kh/y
	"CLR_in_1980_kcu/ftj"	41		kcu/ftj
	"Extra_normal_LPR_from_2022_(1)"	RAMP("Goal_for_extra_normal_LPR_(1)"/Wellbeing_trust_and_tension.Introduction_period_for_policy_y, 2022, 2022+Wellbeing_trust_and_tension.Introduction_period_for_policy_y)		1
	"Fraction_of_inflation_compensated_(1)"	1		1
	GDP_per_person_in_1980	6,4		k$/(p*y)
	GDPppeoROCCLR	MAX(0, 1+"sGDPppeoROCCLR<0"*(Population."GDP_per_person_k$/p/y"/GDP_per_person_in_1980-1))		1

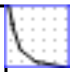
	"Goal_for_extra_normal_LPR_(1)"	0		1
	"Hiring/firing_delay_y"	"10-yr_loop_delay_y"/3		1
	"Hours_worked_mult_from_GDPpp_(1)"	1+"sTIeoNHW<0"*(Population."GDP_per_person_k$/p/y"/GDP_pe		1
	"Indicated_labour_participation_rate_(1)"	"Normal_LPR_(1)"-"Perceived_surplus_workforce_(1)"		1
	"Indicated_wage_effect_on_optimal_CLR_(1)"	1+"sWSOeoCLR>0"*("Worker_share_of_output_(1)"/"WSO_in_1980_(1)"-1)		1
	"Labour_participation_rate_(1)"	SMTH1("Indicated_labour_participation_rate_(1)", "Time_to_enter/leave_labor_market_y")		1
	"Labour_productivity_$/ph"	(Inventory."Output_Gu/y"*Output."Price_per_unit_$/u")/"Labour_use_Gph/y"		$/ph
	"Labour_productivity_in_1980_$/ph"	(Output."Optimal_output_in_1980_Gu/y"*Output."Cost_per_unit_in_1980_$/u")/"Labour_use_in_1980_Gph/y"		$/ph
	"Labour_use_Gph/y"	Workforce_Mp*"Average_hours_worked_kh/y"		Gph/y
	"Labour_use_in_1980_Gph/y"	Workforce_in_1980_Mp*"Average_hours_worked_in_1980_kh/y"		Gph/y
	"Normal_hours_worked_in_1980_kh/ftj/y"	2		kh/(ftj*y)
	"Normal_hours_worked_kh/ftj/y"	SMTH1("Normal_hours_worked_in_1980_kh/ftj/y"*"Hours_worked_mult_from_GDPpp_(1)", Time_to_adjust_hours_worked_y, "Normal_hours_worked_in_1980_kh/ftj/y")		kh/(ftj*y)
	"Normal_LPR_(1)"	("Normal_LPR_in_1980_(1)"*(1+"sWSOeoLPR>0"*("Worker_share_of_output_(1)"/"WSO_in_1980_(1)"-1))+"Extra_normal_LPR_from_2022_(1)"		1
	"Normal_LPR_in_1980_(1)"	0,85		1
	"Optimal_capital_labour_ratio_kcu/ftj"	"Embedded_CLR_kcu/ftj"*"Wage_effect_on_optimal_CLR_(1)"		kcu/ftj
	Optimal_workforce_Mp	(Output.Capacity_Gcu/"Optimal_capital_labour_ratio_kcu/ftj")*"Persons_per_full-time_job_p/ftj"		Mp
	"Participation_(1)"	"Labour_participation_rate_(1)"*(1-"Perceived_unemployment_rate_(1)")		1
	"Perceived_surplus_workforce_(1)"	"Acceptable_unemployment_rate_(1)"*(1+"sPUNeoLPR>0"*("Perceived_unemployment_rate_(1)"/"Acceptable_unemployment_rate_(1)"-1))		1

	"Perceived_unemployment_rate_(1)"	SMTH1("Unemployment_rate_(1)", Unemployment_perception_time_y, "Unemployment_rate_in_1980_(1)")		
	"Persons_per_full-time_job_in_1980_p/ftj"	1		p/ftj
	"Persons_per_full-time_job_p/ftj"	1		p/ftj
	"Real_wage_erosion_rate_1/y"	0,015		y
	"ROC_in_ECLR_1/y"	"ROC_in_ECLR_in_1980_1/y"*GDPppeoROCCLR		1/y
	"ROC_in_ECLR_in_1980_1/y"	0,02		1/y
	"ROC_in_WSO_-_Table_1/y"	GRAPH("Perceived_unemployment_rate_(1)"/"Acceptable_unemployment_rate_(1)") Points: (0.000, 0.06), (0.500, 0.02), (1.000, 0), (1.500, -0.007), (2.000, -0.01)		1/y
	"sGDPppeoROCCLR<0"	-0,1		1
	"sPUNeoLPR>0"	0,05		1
	"sTIeoNHW<0"	-0,03		1
	"sWSOeoCLR>0"	1,05		1
	"sWSOeoLPR>0"	0,2		1
	Time_to_adjust_hours_worked_y	5		y
	Time_to_change_tooling_y	"10-yr_loop_delay_y"/3		y
	"Time_to_enter/leave_labor_market_y"	5		y
	Unemployed_Mp	MAX(0, Available_workforce_Mp-Workforce_Mp)		Mp
	Unemployment_perception_time_y	"10-yr_loop_delay_y"/3		y
	"Unemployment_rate_(1)"	Unemployed_Mp/Available_workforce_Mp		1
	"Unemployment_rate_in_1980_(1)"	0,05		1
	"Wage_effect_on_optimal_CLR_(1)"	SMTH1("Indicated_wage_effect_on_optimal_CLR_(1)", Time_to_change_tooling_y)		1
	"Wage_rate_erosion_rate_1/y"	Inventory."Inflation_rate_1/y"*(1-"Fraction_of_inflation_compensated_(1)")		1/y
	"Wage_rate_in_1980_$/ph"	"Labour_productivity_in_1980_$/ph"*"WSO_in_1980_(1)"		$/ph
	"Wage_share_(1)"	"Wage_rate_$/ph"/"Labour_productivity_$/ph"		1
	Workforce_in_1980_Mp	1530		Mp

	Working_age_population_Mp	Population."Aged_20-pension_age_Mp"		Mp
	"WSO_in_1980_(1)"	0,5		1
	Other_performance_indicators:			
	"Fraction_below_6.85_$/p/day"	1-(1/(1+EXP(-"Logistic_k_(1)_1"*("GDP_per_person_$/p/day"-(13.9*1000/365.25)))))		
	"SDG1:_Population_below_6.85_$/p/day_Mp"	Population.Population_Mp*"Fraction_below_6.85_$/p/day"		Mp
	"Cost_of_food_and_energy_TAs_G$/y"	Food_and_land_use."Cost_of_food_G$/y"+Energy."Cost_of_energy_G$/y"		
	"Cost_of_TAs_G$/y"	"Cost_of_food_and_energy_TAs_G$/y"		G$/y
	"Factor_to_avoid_transient_in_growth_rate_(1)"	0,93		1
	"GDP_per_person_$/p/day"	Population."GDP_per_person_k$/p/y"*1000/365.25		
	"Inequity_effect_on_logistic_k_(1)_1"	1+"sINEeoLOK<0_1"*(Demand."Inequality_(1)"/0.5-1)		1
	"Logistic_k_(1)_1"	"Normal_k_(1)_1"*"Inequity_effect_on_logistic_k_(1)_1"		1
	"Normal_k_(1)_1"	0,08		1
	"Past_GDP_per_person_k$/y"	SMTH1(Population."GDP_per_person_k$/p/y", Time_to_establish_growth_rate_y, Population."GDP_per_person_in_1980_k$/p/y"*"Factor_to_avoid_transient_in_growth_rate_(1)")		k$/(p*y)
	"RATE_OF_GROWTH_IN_GDP_PER_PERSON_1/y"	((Population."GDP_per_person_k$/p/y"-"Past_GDP_per_person_k$/y")/"Past_GDP_per_person_k$/y")/Time_to_establish_growth_rate_y		1/y
	"sINEeoLOK<0_1"	-0,5		1
	Time_to_establish_growth_rate_y	4		y
	Output:			
	Capacity_PIS_Gcu(t)	Capacity_PIS_Gcu(t - dt) + ("Capacity_addition_PIS_Gcu/y" - "Capacity_discard_PIS_Gcu/y") * dt	INIT Capacity_PIS_Gcu = CAP_PIS_in_1980_Gcu	Gcu
	Capacity_PUS_Gcu(t)	Capacity_PUS_Gcu(t - dt) + ("Capacity_addition_PUS_Gcu/y" - "Capacity_discard_PUS_Gcu/y") * dt	INIT Capacity_PUS_Gcu = CAP_PUS_in_1980_Gcu	Gcu

	Capacity_under_construction_PIS_Gcu(t)	Capacity_under_construction_PIS_Gcu(t - dt) + ("Capacity_initiation_PIS_Gcu/y" - "Capacity_addition_PIS_Gcu/y") * dt	INIT Capacity_under_construction_PIS_Gcu = CUC_PIS_in_1980_Gcu	Gcu
	Capacity_under_construction_PUS_Gcu(t)	Capacity_under_construction_PUS_Gcu(t - dt) + ("Capacity_initiation_PUS_Gcu/y" - "Capacity_addition_PUS_Gcu/y") * dt	INIT Capacity_under_construction_PUS_Gcu = CUC_PUS_in_1980_Gcu	Gcu
	"Embedded_TFP_(1)"(t)	"Embedded_TFP_(1)"(t - dt) + ("Effect_of_capacity_renewal_1/y") * dt	INIT "Embedded_TFP_(1)" = "Embedded_TFP_in_1980_(1)"	1
	"Capacity_addition_PIS_Gcu/y"	Capacity_under_construction_PIS_Gcu/Construction_time_PIS_y		Gcu/Year
	"Capacity_addition_PUS_Gcu/y"	Capacity_under_construction_PUS_Gcu/Construction_time_PUS_y		Gcu/Year
	"Capacity_discard_PIS_Gcu/y"	Capacity_PIS_Gcu/Life_of_capacity_PIS_y		Gcu/Year
	"Capacity_discard_PUS_Gcu/y"	Capacity_PUS_Gcu/Life_of_capacity_PUS_y		Gcu/Year
	"Capacity_initiation_PIS_Gcu/y"	MAX(("Investment_in_new_capacity_PIS_G$/y"+"Off-balance_sheet_govmnt_inv_in_PIS_(share_of_GDP)"*Inventory."GDP_G$/y")/"Cost_of_capacity_$/cu", 0)		Gcu/Year
	"Capacity_initiation_PUS_Gcu/y"	MAX((Demand."Govmnt_investment_in_public_capacity_G$/y"+"Off-balance-sheet_govmnt_inv_in_PUS_(share_of_GDP)"*Inventory."GDP_G$/y")/"Cost_of_capacity_$/cu", 0)		Gcu/Year
	"Effect_of_capacity_renewal_1/y"	(Public_sector."Indicated_TFP_(1)"-"Embedded_TFP_(1)")*"Capacity_renewal_rate_1/y"		Per Year
	"Available_capital_G$/y"	Demand."Total_savings_G$/y"+"Foreign_capital_inflow_G$/y"		G$/y
	CAP_PIS_in_1980_Gcu	59250		Gcu
	CAP_PUS_in_1980_Gcu	5350		Gcu
	Capacity_Gcu	Capacity_PIS_Gcu+Capacity_PUS_Gcu		Gcu
	"Capacity_renewal_rate_1/y"	"Capacity_addition_PIS_Gcu/y"/Capacity_PIS_Gcu		1/y

	"CBC_effect_on_flow_to_capacity_addion_(1)"	1+"sCBCeoFRA<0"*(Finance."Corporate_borrowing_cost_1/y"/Finance."Corporate_borrowing_cost_in_1980_1/y"-1)		1
	Construction_time_PIS_y	1,5		y
	Construction_time_PUS_y	1,5		y
	"Cost_of_capacity_$/cu"	"Cost_of_capacity_in_1980_$/cu"*"OWeoCOC_(1)"		$/cu
	"Cost_of_capacity_in_1980_$/cu"	1		$/cu
	"Cost_per_unit_in_1980_$/u"	0,8		$/u
	CUC_PIS_in_1980_Gcu	(CAP_PIS_in_1980_Gcu/Life_of_capacity_PIS_in_1980_y)*Construction_time_PIS_y*"Extra_mult_on_CUC,_to_avoid_initial_transient_in_Investment_share_of_GDP"		Gcu
	CUC_PUS_in_1980_Gcu	(CAP_PUS_in_1980_Gcu/Life_of_capacity_PUS_in_1980_y)*Construction_time_PUS_y*"Extra_mult_on_CUC,_to_avoid_initial_transient_in_Investment_share_of_GDP"		Gcu
	"ED_effect_on_flow_to_capacity_addition_(1)"	1+"sEDeoFRA>0"*("Perceived_excess_demand_(1)"/"Excess_demand_in_1980_(1)"-1)		1
	"Embedded_labour_productivity_in_1980_k$/p/y"	"Optimal_output_in_1980_Gu/y"/"Jobs_in_1980_M-ftj"		k$/(p*y)
	"Embedded_TFP_in_1980_(1)"	1		1
	"Excess_demand_(1)"	Demand."Total_purchasing_power_G$/y"/"Optimal_ouput_-_value_G$/y"		1
	"Excess_demand_effect_on_life_of_capacity_(1)"	1+"sEDeoLOC>0"*("Perceived_excess_demand_(1)"/"Excess_demand_in_1980_(1)"-1)		1
	"Excess_demand_in_1980_(1)"	1		1
	"Extra_mult_on_CUC,_to_avoid_initial_transient_in_Investment_share_of_GDP"	1,7		1
	"Foreign_capital_inflow_G$/y"	0		G$/y
	"FRA_in_1980_(1)"	0,9		1
	FRACA_min	0,65		1
	"FRACA_mult_from_GDPpp_-_Line_(1)"	MAX(FRACA_min, 1+"sGDPppeoFRACA<0"*(Population."GDP_per_person_k$/p/y"/Labour_market.GDP_per_person_in_1980-1))		1

	"FRACA_mult_from_GDPpp_-_Table_(1)"	GRAPH(Population."GDP_per_person_k$/p/y"/Labour_market.GDP_per_person_in_1980) Points: (0.00, 1.0000), (1.00, 1.0000), (2.00, 0.8500), (2.10, 0.8400), (4.00, 0.6500), (8.00, 0.5500), (16.00, 0.5000)		
	"Fraction_of_available_capital_to_new_capacity_(1)"	SMTH1("FRA_in_1980_(1)"*"FRACA_mult_from_GDPpp_-_Line_(1)"*("WSO_effect_on_flow_to_capacity_addition_(1)"+"CBC_effect_on_flow_to_capacity_addion_(1)"+"ED_effect_on_flow_to_capacity_addition_(1)")/3, Investment_planning_time_y)		1
	"Investment_in_new_capacity_PIS_G$/y"	"Available_capital_G$/y"*"Fraction_of_available_capital_to_new_capacity_(1)"		G$/y
	Investment_planning_time_y	1		y
	"Investment_share_of_GDP_(1)"	("Investment_in_new_capacity_PIS_G$/y"+Demand."Govmnt_investment_in_public_capacity_G$/y")/Inventory."GDP_G$/y"		1
	"Jobs_in_1980_M-ftj"	1600		Mp
	Kappa	0,3		1
	Lambda	1-Kappa		1
	Life_of_capacity_PIS_in_1980_y	15		y
	Life_of_capacity_PIS_y	(Life_of_capacity_PIS_in_1980_y*"OWeoLOC_(1)")/"Excess_demand_effect_on_life_of_capacity_(1)"		y
	Life_of_capacity_PUS_in_1980_y	15*"OWeoLOC_(1)"		y
	Life_of_capacity_PUS_y	Life_of_capacity_PUS_in_1980_y		y
	"Margin_in_1980_(1)"	0,25		1
	"Off-balance_sheet_govmnt_inv_in_PIS_(share_of_GDP)"	(IF TIME > 2022 THEN "Unconventional_stimulus_in_PIS_from_2022_(share_of_GDP)" ELSE 0)		1
	"Off-balance-sheet_govmnt_inv_in_PUS_(share_of_GDP)"	(IF TIME > 2022 THEN 0.01+"Unconventional_stimulus_in_PUS_from_2022_(share_of_GDP)" ELSE 0.01)		1
	"Optimal_ouput_-_value_G$/y"	"Optimal_real_output_Gu/y"*"Price_per_unit_$/u"		G$/y
	"Optimal_output_in_1980_Gu/y"	CAP_PIS_in_1980_Gcu/"PCOR_PIS_cu/u/y"+CAP_PUS_in_1980_Gcu/"PCOR_PUS_cu/u/y"		G$/y

	"Optimal_real_output_Gu/y"	"Optimal_output_in_1980_Gu/y"*((Capacity_PIS_Gcu+Capacity_PUS_Gcu)/(CAP_PIS_in_1980_Gcu+CAP_PUS_in_1980_Gcu))^Kappa*(Labour_market."Labour_use_Gph/y"/Labour_market."Labour_use_in_1980_Gph/y")^Lambda*("Embedded_TFP_(1)")		G$/y
	"Output_growth_in_1980_1/y_(to_avoid_transient)"	0,06		1/y
	"Output_growth_rate_1/y"	SMTH1(("Optimal_real_output_Gu/y"-"Output_last_year_G$/y")/"Output_last_year_G$/y"/1, 1, "Output_growth_in_1980_1/y_(to_avoid_transient)")		1/y
	"Output_last_year_G$/y"	SMTH1("Optimal_real_output_Gu/y", 1, "Optimal_output_in_1980_Gu/y"/(1+"Output_growth_in_1980_1/y_(to_avoid_transient)"))		G$/y
	"OWeoCOC_(1)"	(IF TIME > 2022 THEN 1+"sOWeoCOC>0"*(Climate.Observed_warming_deg_C/Climate.Observed_warming_in_2022_deg_C-1) ELSE 1)		1
	"OWeoLOC_(1)"	(IF TIME > 2022 THEN 1+"sOWeoLOC<0"*(Climate.Observed_warming_deg_C/Climate.Observed_warming_in_2022_deg_C-1) ELSE 1)		1
	"PCOR_PIS_cu/u/y"	2,3		y
	"PCOR_PUS_cu/u/y"	2,3		y
	"Perceived_excess_demand_(1)"	SMTH1("Excess_demand_(1)", Time_to_observe_excess_demand_y, 1)		1
	"Price_per_unit_$/u"	"Cost_per_unit_in_1980_$/u"*(1+"Margin_in_1980_(1)")		$/u
	"sCBCeoFRA<0"	-0,8		1
	"sEDeoFRA>0"	5		1
	"sEDeoLOC>0"	0,5		1
	"sGDPppeoFRACA<0"	-0,2		1
	"sOWeoCOC>0"	0,2		1
	"sOWeoLOC<0"	-0,1		1
	"sWSOeoFRA<0"	-2,5		1
	Time_to_observe_excess_demand_y	1		
	"Unconventional_stimulus_in_PIS_from_20	0		1

	"Unconventional_stimulus_in_PUS_from_20	0		1
	"WSO_effect_on_flow_to_capacity_addition_(1)"	1+"sWSOeoFRA<0"*(Labour_market."Wage_share_(1)"/Labour_market."WSO_in_1980_(1)"-1)		1
	Population:			
	"Aged_0-20_years_Mp"(t)	"Aged_0-20_years_Mp"(t - dt) + ("Births_Mp/y" - "Passing_20_Mp/y") * dt	INIT "Aged_0-20_years_Mp" = "Aged_0-20_in_1980_Mp"	Mp
	"Aged_20-40_years_Mp"(t)	"Aged_20-40_years_Mp"(t - dt) + ("Passing_20_Mp/y" - "Passing_40_Mp/y") * dt	INIT "Aged_20-40_years_Mp" = "Aged_20-40_in_1980_Mp"	Mp
	"Aged_40-60_Mp"(t)	"Aged_40-60_Mp"(t - dt) + ("Passing_40_Mp/y" - "Passing_60_Mp/y") * dt	INIT "Aged_40-60_Mp" = "Aged_40-60_in_1980_Mp"	Mp
	"Aged_60_+_Mp"(t)	"Aged_60_+_Mp"(t - dt) + ("Passing_60_Mp/y" - "Deaths_Mp/y") * dt	INIT "Aged_60_+_Mp" = "Aged_60+_in_1980_Mp"	Mp
	"Births_Mp/y"	"Aged_20-40_years_Mp"*"Fraction_women_(1)"*(Observed_fertility_1/Fertile_period_y)		Mp/Year
	"Deaths_Mp/y"	DELAYN("Passing_60_Mp/y",LE_at_60_y,Order,"Dying_in_1980_Mp/y")		Mp/Year
	"Passing_20_Mp/y"	DELAYN("Births_Mp/y",20,Order,"Passing_20_in_1980_Mp/y")		Mp/Year
	"Passing_40_Mp/y"	DELAYN("Passing_20_Mp/y",20,Order,"Passing_40_in_1980_Mp/y")		Mp/Year
	"Passing_60_Mp/y"	DELAYN("Passing_40_Mp/y",20,Order,"Passing_60_in_1980_Mp/y")		Mp/Year
	"Aged_0-20_in_1980_Mp"	2170		Mp
	"Aged_20-40_in_1980_Mp"	1100		Mp
	"Aged_20-pension_age_Mp"	"Aged_20-40_years_Mp"+"Aged_40-60_Mp"+"Aged_60_+_Mp"-On_pension_Mp		Mp
	"Aged_40-60_in_1980_Mp"	768		Mp
	"Aged_60+_in_1980_Mp"	382		Mp
	"Birth_rate_1/y"	"Births_Mp/y"/Population_Mp		1/y

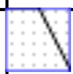
	"Cost_of_extra_fertility_reduction_(share_of_GDP)"	"Cost_of_Max_fertility_reduction_(share_of_GDP)"*"Extra_fertility_reduction_(1)"		1
	"Cost_of_Max_fertility_reduction_(share_of_GDP)"	0,01		1
	"Death_rate_1/y"	"Deaths_Mp/y"/Population_Mp		1/y
	"Dependency_ratio_p/p"	("Aged_0-20_years_Mp"+"Aged_60_+_Mp")/("Aged_20-40_years_Mp"+"Aged_40-60_Mp")		1
	Desired_no_of_children_1	((DNCmin+(DNC_in_1980-DNCmin)*EXP(-DNCgamma*("Effective_GDP_per_person_k$/p/y"-"GDP_per_person_in_1980_k$/p/y")))*(1+"DNCalfa<0"*("Effective_GDP_per_person_k$/p/y"-"GDP_per_person_in_1980_k$/p/y")))*(1-"Extra_fertility_reduction_(1)")*"Fertility_multiplier_(1)"		1
	DNC_in_1980	4,3		1
	"DNCalfa<0"	0		1/(k$*p*y)
	DNCgamma	0,14		1/k$
	DNCmin	1,2		1
	"Dying_in_1980_Mp/y"	30		Mp/y
	"Effective_GDP_per_person_k$/p/y"	SMTH1("GDP_per_person_k$/p/y", Time_to_adapt_to_higher_income_y, "GDP_per_person_in_1980_k$/p/y")		k$/(p*y)
	"Extra_fertility_reduction_(1)"	RAMP("Goal_for_extra_fertility_reduction_(1)"/Wellbeing_trust_and_tension.Introduction_period_for_policy_y, 2022, 2022+Wellbeing_trust_and_tension.Introduction_period_for_policy_y)		1
	Extra_pension_age_in_2022_y	0		1

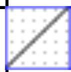
	Extra_pension_age_y	RAMP((Goal_for_extra_pension_age_y-Extra_pension_age_in_2022_y)/Wellbeing_trust_and_tension.Introduction_period_for_policy_y, 2022, 22022+Wellbeing_trust_and_tension.Introduction_period_for_policy_y)		1/y
	Fertile_period_y	20		y
	"Fertility_multiplier_(1)"	(IF "SSP2_family_action_from_2022?_(1)" > 0 THEN (IF TIME > 2022 THEN 1+RAMP(("Max_fertility_multiplier_(1)"-1)/78, 2022, 2100) ELSE 1) ELSE 1)		
	"Fraction_achieving_desired_family_size_(1)"	0,8		1
	"Fraction_women_(1)"	0,5		1
	"GDP_per_person_in_1980_k$/p/y"	6,4		k$/(p*y)
	"GDP_per_person_k$/p/y"	Inventory."GDP_G$/y"/Population_Mp		k$/(p*y)
	"Goal_for_extra_fertility_reduction_(1)"	0		1
	Goal_for_extra_pension_age_y	0		1
	LE_at_60_y	Life_expectancy_y-60		y
	LE_in_1980	67		y
	LEalfa	0,001		1/(k$*p*y)
	LEgamma	0,15		1/(k$*p*y)
	LEmax	85		y
	"Life_expectancy_multipler_(1)"	(IF "SSP2_family_action_from_2022?_(1)" > 0 THEN (IF TIME > 2022 THEN 1+RAMP(("Max_life_expectancy_multiplier_(1)"-1)/78, 2022, 2100) ELSE 1) ELSE 1)		
	Life_expectancy_y	((LEmax-(LEmax-LE_in_1980)*EXP(-LEgamma*("Effective_GDP_per_person_k$/p/y"-"GDP_per_person_in_1980_k$/p/y")))*(1+LEalfa*("Effective_GDP_per_person_k$/p/y"-"GDP_per_person_in_1980_k$/p/y")))*"Warming_effect_on_life_expectancy_(1)"*"Life_expectancy_multipler_(1)"		y
	"Max_fertility_multiplier_(1)"	1,6		1
	"Max_life_expectancy_multiplier_(1)"	1,1		1

	Observed_fertility_1	Desired_no_of_children_1*"Fraction_achieving_desired_family_size_(1)"		1
	On_pension_Mp	"Aged_60_+_Mp"*(Life_expectancy_y-Pension_age_y)/(Life_expectancy_y-60)		Mp
	Order	10		1
	"Passing_20_in_1980_Mp/y"	100		Mp/y
	"Passing_40_in_1980_Mp/y"	64		Mp/y
	"Passing_60_in_1980_Mp/y"	38		Mp/y
	Pension_age_in_1980_y	62		y
	Pension_age_y	(IF Life_expectancy_y < LE_in_1980 THEN Pension_age_in_1980_y ELSE Pension_age_in_1980_y+"sLEeoPa>0"*(Life_expectancy_y+Extra_pension_age_y-LE_in_1980))		y
	"Pensioners_per_worker_p/p"	On_pension_Mp/"Aged_20-pension_age_Mp"		1
	"Population_growth_rate_1/y"	"Birth_rate_1/y"-"Death_rate_1/y"		1/y
	Population_Mp	"Aged_0-20_years_Mp"+"Aged_20-40_years_Mp"+"Aged_40-60_Mp"+"Aged_60_+_Mp"		Mp
	"sLEeoPa>0"	0,75		1
	"sOWeoLE<0"	-0,02		1
	"SSP2_family_action_from_2022?_(1)"	1		1
	Time_to_adapt_to_higher_income_y	10		y
	"Warming_effect_on_life_expectancy_(1)"	(IF TIME > 2022 THEN MAX(0, 1+"sOWeoLE<0"*(Climate.Observed_warming_deg_C/Climate.Observed_warming_in_2022_deg_C-1)) ELSE 1)		1
	Public_sector:			
	"TFP_excluding_effect_of_5TAs_(1)"(t)	"TFP_excluding_effect_of_5TAs_(1)"(t - dt) + ("Change_in_TFP_1/y") * dt	INIT "TFP_excluding_effect_of_5TAs_(1)" = "TFP_in_1980_(1)"	1
	"Change_in_TFP_1/y"	"Rate_of_technological_advance_1/y"*"TFP_excluding_effect_of_5TAs_(1)"		Per Year
	"Cost_of_TAs_in_2022_G$/y"	9145		G$/y

	"Domestic_rate_of_technological_advance_1/y"	("Domestic_ROTA_in_1980_1/y" +((IF TIME > 2022 THEN "Extra_domestic_ROTA_from_2022_1/y" ELSE 0))*(1+"sSCeoROTA>0"*("State_capacity_(fraction_of_GDP)"/"State_capacity_in_1980_(fraction_of_GDP)"-1)))		1/y
	"Domestic_ROTA_in_1980_1/y"	0,01		1/y
	"Extra_cost_of_TAs_as_share_of_GDP_(1)"	"Extra_cost_of_TAs_from_2022_G$/y"/Inventory."GDP_G$/y"		1
	"Extra_cost_of_TAs_from_2022_G$/y"	MAX(0, Other_performance_indicators."Cost_of_TAs_G$/y"-"Cost_of_TAs_in_2022_G$/y")		G$/y
	"Extra_domestic_ROTA_from_2022_1/y"	0,003		1/y
	"Fraction_unprofitable_activity_in_TAs_(1)"	0,3		1
	"GDPpp_of_technology_leader_k$/p/y"	15		k$/(p*y)
	Govmnt_spending_as_share_of_GDP	Demand."Govmnt_spending_G$/y"/Inventory."GDP_G$/y"		1
	"Imported_ROTA_1/y"	(IF TIME > 2022 THEN MAX(0, "Max_imported_ROTA_from_2022_1/y"*(1-1*(Population."GDP_per_person_k$/p/y"/"GDPpp_of_technology_leader_k$/p/y"-1))) ELSE 0)		1
	"Indicated_TFP_(1)"	"TFP_including_effect_of_5TAs_(1)"*OWeoTFP		1
	Infrastructure_purchases_ratio_in_1980_y	1,2		y
	Infrastructure_purchases_ratio_y	Output.Capacity_PUS_Gcu/Demand."Govmnt_purchases_G$/y"		y
	"Max_imported_ROTA_from_2022_1/y"	0		1/y
	OWeoTFP	(IF TIME > 2022 THEN 1+"sOWeoTFP<0"*(Climate.Observed_warming_deg_C/Climate.Observed_warming_in_2022_deg_C-1) ELSE 1)		1
	"Productivity_loss_from_unprofitable_activity_(1)"	"Extra_cost_of_TAs_as_share_of_GDP_(1)"*"Fraction_unprofitable_activity_in_TAs_(1)"		1
	"Productivity_of_public_purchases_(1)"	MAX(0, 1+"sIPReoVPSS>0"*LN(Infrastructure_purchases_ratio_y/Infrastructure_purchases_ratio_in_1980_y))		1
	"Public_services_per_person_k$/p/y"	"Value_of_public_services_supplied_G$/y"/Population.Population_Mp		k$/(p*y)
	"Public_spending_per_person_k$/p/y"	Demand."Govmnt_spending_G$/y"/Population.Population_Mp		k$/(p*y)

	"Rate_of_technological_advance_1/y"	("Domestic_rate_of_technological_advance_1/y"+0)*"Reduction_in_ROTA_from_inequality_1/y"+"Imported_ROTA_1/y"		1/y
	"Reduction_in_ROTA_from_inequality_1/y"	MIN(1, 1+"sIIEeoROTA<0"*(Demand."INEQUALITY_INDEX_(1980=1)"/1-1))		1
	"Reduction_in_TFP_from_unprofitable_activity_(1)"	SMTH1("Productivity_loss_from_unprofitable_activity_(1)", Output.Investment_planning_time_y+Output.Construction_time_PIS_y)		1
	"sIIEeoROTA<0"	-0,1		1
	"sIPReoVPSS>0"	1		1
	"sOWeoTFP<0"	-0,1		1
	"sSCeoROTA>0"	0,5		1
	"State_capacity_(fraction_of_GDP)"	"Value_of_public_services_supplied_G$/y"/Inventory."GDP_G$/y"		1
	"State_capacity_in_1980_(fraction_of_GDP)"	0,3		1
	"TFP_in_1980_(1)"	1		1
	"TFP_including_effect_of_5TAs_(1)"	"TFP_excluding_effect_of_5TAs_(1)"*(1-		1
	"Value_of_public_services_supplied_G$/y"	Demand."Govmnt_purchases_G$/y"*"Productivity_of_public_purchases_(1)"		G$/y
	"xExtra_cost_of_TAs_as_share_of_GDP_(1)"	"xExtra_TA_cost_in_2022_(share_of_GDP)"+RAMP(("xExtra_TA_cost_in_2100_(share_of_GDP)"-"xExtra_TA_cost_in_2022_(share_of_GDP)")/78, 2022, 2022+78)		1
	"xExtra_TA_cost_in_2022_(share_of_GDP)"	0		
	"xExtra_TA_cost_in_2100_(share_of_GDP)"	0		1
	Wellbeing_trust_and_tension:			
	"Acceptable_inequality_(1)"	0,6		1
	"Acceptable_progress_1/y"	0,02		1/y
	"Average_wellbeing_from_disposable_income_(1)"	EXP("Diminishing_return_disposable_income_(1)"+LN(Demand."Worker_disposable_income_k$/p/y"/"Threshold_disposable_income_k$/p/y"))		1
	"Average_wellbeing_from_global_warming_(1)"	MAX("Min_wellbeing_from_global_warming_(1)", MIN(1, 1+"sGWeoAW<0"*(Climate.Perceived_warming_deg_C/Threshold_warming_deg_C-1)))		1

	"Average_wellbeing_from_inequality_(1)"	1+"sIleoAW<0"*(Demand."Inequality_(1)"/"Threshold_inequality_(1)"-1)		1
	"Average_wellbeing_from_progress_(1)"	(1+"sROPeoAW>0"*("Observed_rate_of_progress_1/y"-"Threshold_progress_rate_1/y"))*"Wellbeing_effect_of_participation_(1)"		1
	"Average_wellbeing_from_public_spending_(1)"	EXP("Diminishing_return_public_spending_(1)"+LN(Public_sector."Public_spending_per_person_k$/p/y"/"Threshold_public_spending_k$/p/y"))		1
	"AVERAGE_WELLBEING_INDEX_(1)"	(0.5*"Average_wellbeing_from_disposable_income_(1)"+0.5*"Average_wellbeing_from_public_spending_(1)")*"Average_wellbeing_from_inequality_(1)"*"Average_wellbeing_from_global_warming_(1)"*"Average_wellbeing_from_progress_(1)"		1
	Average_wellbeing_perception_delay_y	9		y
	"AWI_in_1980_(1)"	0,65		1
	"Diminishing_return_disposable_income_(1)"	0,5		1
	"Diminishing_return_public_spending_(1)"	0,7		1
	Exogenous_introduction_period_y	30		y
	Exogenous_introduction_period?	0		1
	Indicated_reform_delay_y	Normal_reform_delay_y*"Social_trust_effect_on_reform_delay_(1)"*"Social_tension_effect_on_reform_delay_(1)"		
	"Indicated_social_trust_(1)"	"Public_spending_effect_on_social_trust_(1)"*"Inequity_effect_on_social_trust_(1)"		1
	"Inequity_effect_on_social_trust_(1)"	GRAPH(Demand."Inequality_(1)"/"Acceptable_inequality_(1)") Points: (0.000, 1.000), (1.000, 1.000), (2.000, 0.000)		1
	Introduction_period_for_policy_y	(IF Exogenous_introduction_period? > 0 THEN Exogenous_introduction_period_y ELSE Reform_delay_y)		y
	"Min_wellbeing_from_global_warming_(1)"	0,2		1
	Normal_reform_delay_y	30		1

	"Observed_rate_of_progress_1/y"	SMTH1((("AVERAGE_WELLBEING_INDEX_(1)"-"Past_AWI_(1)")/"AVERAGE_WELLBEING_INDEX_(1)")/Average_wellbeing_perception_delay_y, Average_wellbeing_perception_delay_y, 0)		
	"Past_AWI_(1)"	SMTH1("AVERAGE_WELLBEING_INDEX_(1)", Average_wellbeing_perception_delay_y, "AWI_in_1980_(1)")		1
	Public_spending_as_share_of_GDP	Public_sector."Public_spending_per_person_k$/p/y"/Population."GDP_per_person_k$/p/y"		1
	"Public_spending_effect_on_social_trust_(1)"	GRAPH(Public_spending_as_share_of_GDP/"Satisfactory_public_spending_(1)") Points: (0.000, 0.000), (1.000, 1.000)		1
	Reform_delay_y	SMTH1(Indicated_reform_delay_y, Time_to_change_reform_delay_y)		y
	"Satisfactory_public_spending_(1)"	0,3		1
	"sGWeoAW<0"	-0,58		1
	"sIleoAW<0"	-0,6		1
	"sLPeoAWP>0"	0,5		1
	"Social_tension_(1)"	1+"sPPReoSTE<0"*("Observed_rate_of_progress_1/y"-"Acceptable_progress_1/y")		1
	"Social_tension_effect_on_reform_delay_(1)"	1+"sSTEeoRD>0"*("Social_tension_(1)"/"Social_tension_in_1980_(1)"-1)		1
	"Social_tension_in_1980_(1)"	1,3		1
	"Social_trust_(1)"	SMTH1("Indicated_social_trust_(1)", Time_to_establish_social_trust_y, "Social_trust_in_1980_(1)")		1
	"Social_trust_effect_on_reform_delay_(1)"	1+"sSTReoRD<0"*("Social_trust_(1)"/"Social_trust_in_1980_(1)"-1)		1
	"Social_trust_in_1980_(1)"	0,6		1
	"sPPReoSTE<0"	-15		1
	"sROPeoAW>0"	6		1
	"sSTEeoRD>0"	1		1
	"sSTReoRD<0"	-1		1
	"Threshold_disposable_income_k$/p/y"	15		k$/(p*y)
	"Threshold_inequality_(1)"	0,5		
	"Threshold_participation_(1)"	0,8		1
	"Threshold_progress_rate_1/y"	0,02		1

◯	"Threshold_public_spending_k$/p/y"	3		k$/(p*y)
◯	Threshold_warming_deg_C	1		deg C
◯	Time_to_change_reform_delay_y	10		y
◯	Time_to_establish_social_trust_y	10		y
◯	"Wellbeing_effect_of_participation_(1)"	1+"sLPeoAWP>0"*(Labour_market."Labour_participation_rate_(1)"/"Threshold_participation_(1)"-1)		

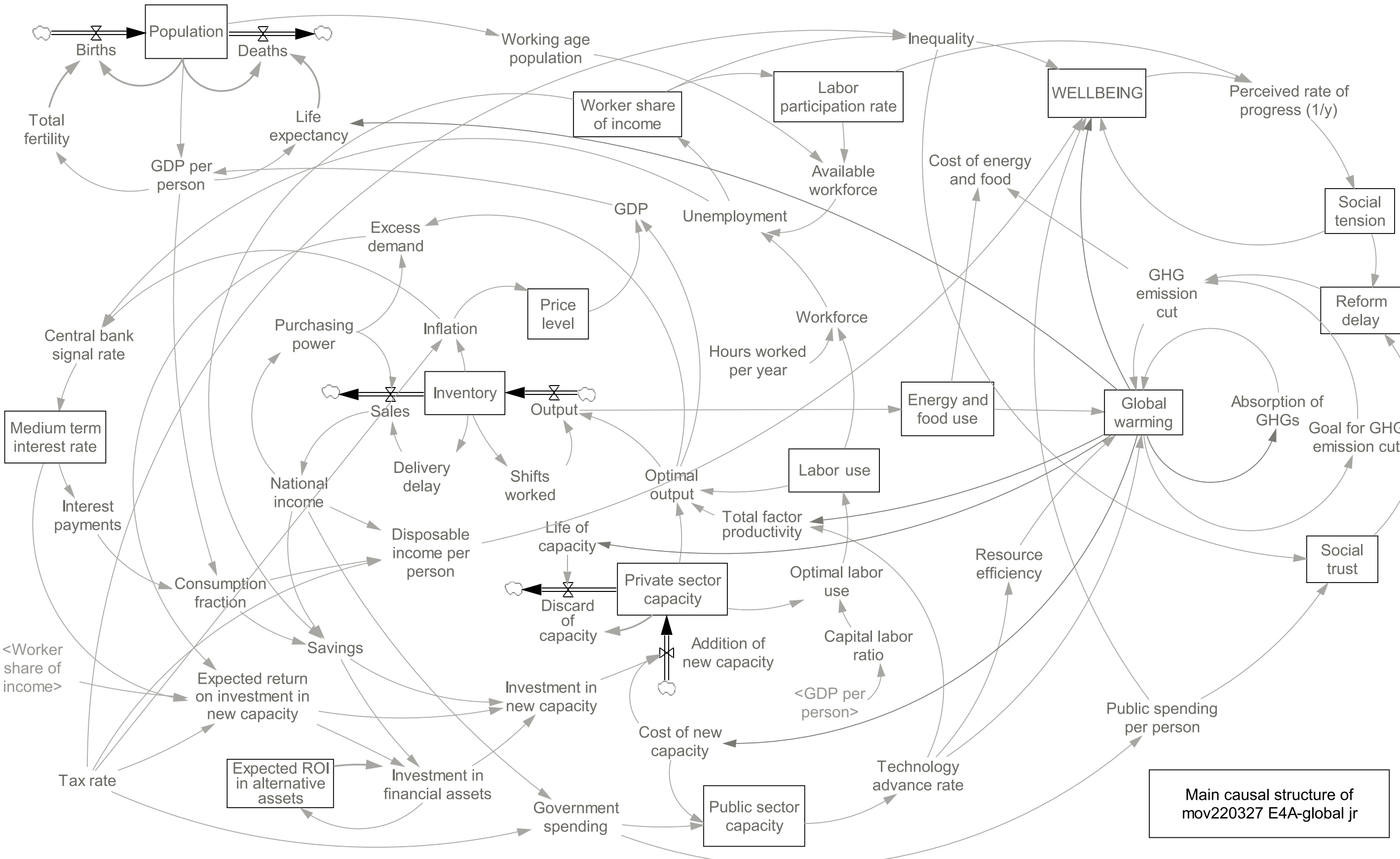


Figure A.1 The main causal loops that make up the core structure of the Earth4All model.