

Armenia: information on national emissions, population and GDP, and mitigation targets

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TODO

- Table with info on target (main and reclass; emissions from NDC; target quantis + plot).
- GWP: NDC emissions converted from AR2 to AR4 by national conversion factor (2010–2017, PRIMAP-hist v2.1).
- References!

1 Non-LULUCF emissions and socio-economic data

With national emissions of 11.2 Mt CO₂eq, Armenia contributed 0.02% to global emissions in 2017, and in 2030 its share is estimated to stay at a similar level (Table 1). The estimates for 2030 are based on the downscaled SSP2¹ Middle of the Road marker scenario (dmSSP2), in which Armenia is estimated to emit 11.6 Mt CO₂eq in 2030. That change in emissions would constitute an increase of 3.4% compared to 2017. The pathways dmSSP1–5 show a range of 11.6–16.2 Mt CO₂eq in 2030, and 15.4–26.2 Mt CO₂eq in 2050. The country's global rank in terms of total emissions per unit of GDP² was 112 in 2017, and 114 regarding the per-capita emissions (117 and 120 in 2030). In terms of accumulated historical emissions, Armenia contributed to the global 1850–2017 emissions by 0.03%. When only accounting for the years 1990–2017, its contribution decreases to 0.02%. All of the emissions are presented following

¹**SSPs:** Shared Socio-economic Pathways. Narratives and challenges to mitigation and adaptation: SSP1: Sustainability, Taking the Green Road (low / low); SSP2: Middle of the Road (medium / medium); SSP3: Regional Rivalry, A Rocky Road (high / high); SSP4: Inequality, A Road Divided (low / high); and SSP5: Fossil-fuelled Development, Taking the Highway (high / low).

²**GDP:** Gross Domestic Product. Throughout this document the GDP is given as GDP PPP, with PPP being the Purchasing Power Parity.

GWP AR4³, and exclude emissions from LULUCF⁴ (exclLU), and bunkers fuels⁵ emissions (exclBunkers).

Table 1: National emissions (dmSSP2), GDP and population for Armenia, together with the emissions per unit of GDP and per capita emissions (all for 2017 and 2030). Additionally, the global share and its rank are displayed.

	Year	Total	Unit	Glob. share	Rank
Emissions	2017	11.2	Mt CO ₂ eq	0.02%	141
	2030	11.6	Mt CO ₂ eq	0.02%	143
GDP	2017	29.1	Billion 2011 GK\$	0.02%	129
	2030	42.7	Billion 2011 GK\$	0.02%	140
Emissions per GDP	2017	0.3	t CO ₂ eq / Thousand 2011 GK\$	0.3%	112
	2030	0.2	t CO ₂ eq / Thousand 2011 GK\$	0.3%	117
Population	2017	2.9	Million Pers	0.03%	136
	2030	2.8	Million Pers	0.03%	140
Emissions per capita	2017	3.8	t CO ₂ eq / Pers	0.2%	114
	2030	4.2	t CO ₂ eq / Pers	0.2%	120

For Armenia, in 2017 the main emissions share on sectoral level (Fig. 1) came from the Energy sector (63.8%), followed by Agriculture (18.1%), and IPPU (10.9%). The Kyoto GHG⁶ with the highest emissions in 2017 was CO₂, constituting 58.4% of the national emissions. Second largest contributor was CH₄ (26.4%), followed by HFCs (8.5%). The total of F-gases⁷ represented 8.5%. The total CO₂ emissions are expected to be 62.4% of the national Kyoto GHG emissions in 2030 (dmSSP2).

The national GDP increased in recent years, and the emissions per unit of GDP had a similar trend (Fig. 2). The population increased, and the per capita emissions were on the rise. Following dmSSP2, the GDP is projected to increase towards 2050. The emissions per GDP are estimated to decrease towards 2050. Armenia’s population is assumed to diminish towards 2050, and the per capita emissions are expected to increase towards 2050.

2 LULUCF emissions

LULUCF emissions data for Armenia are available from the following sources (Fig. 3): UN-FCCC (2019), FAO (2019).

High fluctuations? Data gaps? Difference between sources?

³**Global Warming Potential (GWP)**: we use GWP values from the IPCC 4th Assessment Report (AR4). They reflect the forcing potential of one kilogram of a gas’ emissions in comparison to one kilogram of CO₂ (GWP_{CO2} = 1). The GWPs correspond to a 100-yr period and are for CH₄: 25, for N₂O: 298, for SF₆: 22800, and for NF₃: 17200. For the basket of HFC-gases the GWPs from AR4 are in the range 4–14800, and for PFCs 7190–12200. To assess emissions of several GHGs, their emissions are weighted by their respective GWPs and presented in CO₂ equivalents (CO₂eq).

⁴**LULUCF**: Land Use, Land-Use Change and Forestry. Emissions from LULUCF are excluded throughout the document, unless stated otherwise.

⁵**Bunkers fuels**: emissions from international aviation and shipping.

⁶**Kyoto GHG** (Greenhouse Gas) basket: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆), and nitrogen trifluoride (NF₃).

⁷**F-gases** (fluorinated gases): basket of HFCs, PFCs, and the gases SF₆ and NF₃. Some F-gases have very long atmospheric lifetimes and high Global Warming Potentials.

3 Mitigation targets (NDC)

Give the %cov for the base and target year (and 2017). Global share for 2030 for the mitigated pathways and % reduction relative to 1990 and 2017. Table with the 'input' data and the resulting targets (like `ndcs_targets.csv`). Armenia has an NDC, with a GHG mitigation target of the type AEI (absolute emissions intensity target; main target type). The reclassified⁸ target type equals the main target type.

Table 2: Information on Armenia's GHG mitigation target(s).

type	condi.	range	value	tarYr	intensRef	LU
AEI	condi.	best	5.40 t CO ₂ eq SAR/capita	2025	POP	inclLU
AEI	condi.	best	5.40 t CO ₂ eq SAR/capita	2030	POP	inclLU
AEI	condi.	best	2.069 t CO ₂ eq SAR/capita	2050	POP	inclLU

Table 3: Information on covered sectors and gases as retrieved from NDC and adapted ('Adap.': used to calculate %cov), and their shares in Armenia's 2017 emissions (exclLU, exclBunkers; total 11.2 Mt CO₂eq). If either the sector or gas is assessed as 'not-covered', the emissions from this sector-gas combination are counted as not-covered (-). Else the emissions are counted as covered (+; covered shares given in bold). (/) means that no information is available. LULUCF: NDC '+' and adapted '+' (estimated as a net sink of -0.5 Mt CO₂eq in 2017; based on the 'chosen' LULUCF emissions).

	NDCs	Adap.	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	NF ₃	Total
NDCs			+	+	+	+	/	/	/	
Adap.			+	+	+	+	-	-	-	
Energy	+	+	55.0%	8.5%	0.3%	/	/	/	/	63.8%
IPPU	+	+	2.3%	/	0.09%	8.5%	0.0%	/	/	10.9%
Agri.	/	-	1.2%	11.5%	5.4%	/	/	/	/	18.1%
Waste	+	+	/	6.4%	0.6%	/	/	/	/	7.0%
Other	/	-	/	/	0.2%	/	/	/	/	0.2%
Total			58.4%	26.4%	6.7%	8.5%	0.0%	/	/	100.0%

4 Data sources and references

PRIMAP-hist v2.1: emissions from PRIMAP-hist are data from the country reported data priority scenario (HISTCR). **dmSSPs**: emissions, population and GDP data are PMSSPBIE data for the five marker scenarios.

Links to additional information:

- [CLIMATEWATCH](#)
- [CarbonBrief: Clear on Climate](#)
- [Climate Action Tracker](#)

⁸**Reclassification**: when a country has, e.g., an RBU target (relative reduction compared to Business-As-Usual), and the BAU emissions are provided, it can be quantified based on the given emissions, and is reclassified from type_main RBU to type_reclass ABS (absolute emissions target). Additionally, 'NGT' targets can be reclassified as 'ABU' (absolute reduction compared to Business-As-Usual) if absolute mitigation effects due to planned policies and measures are provided.

- [Country resolved combined emission and socio-economic pathways based on the RCP and SSP scenarios](#) (February 2020)
- [Guest post: Calculating the true climate impact of aviation emissions](#) (September 2020)
- [IGES NDC Database](#)
- [IPCC \(The Intergovernmental Panel on Climate Change\)](#)
- [IPCC Special Report: Global Warming of 1.5°](#) (2018)
- [ISIMIP / ISIpedia](#)
- [NDC Explorer](#)
- [NDC PARTNERSHIP](#)
- [PBL Climate Pledge NDC tool](#)
- [SSP Database \(Shared Socioeconomic Pathways\) - Version 2.0](#) (December 2018)
- [The PRIMAP-hist national historical emissions time series \(1850-2017\)](#) (2019)
- [UNFCCC \(United Nations Framework Convention on Climate Change\)](#)
- [World's richest 1% cause double CO₂ emissions of poorest 50%, says Oxfam](#)
- [#showyourbudgets](#)

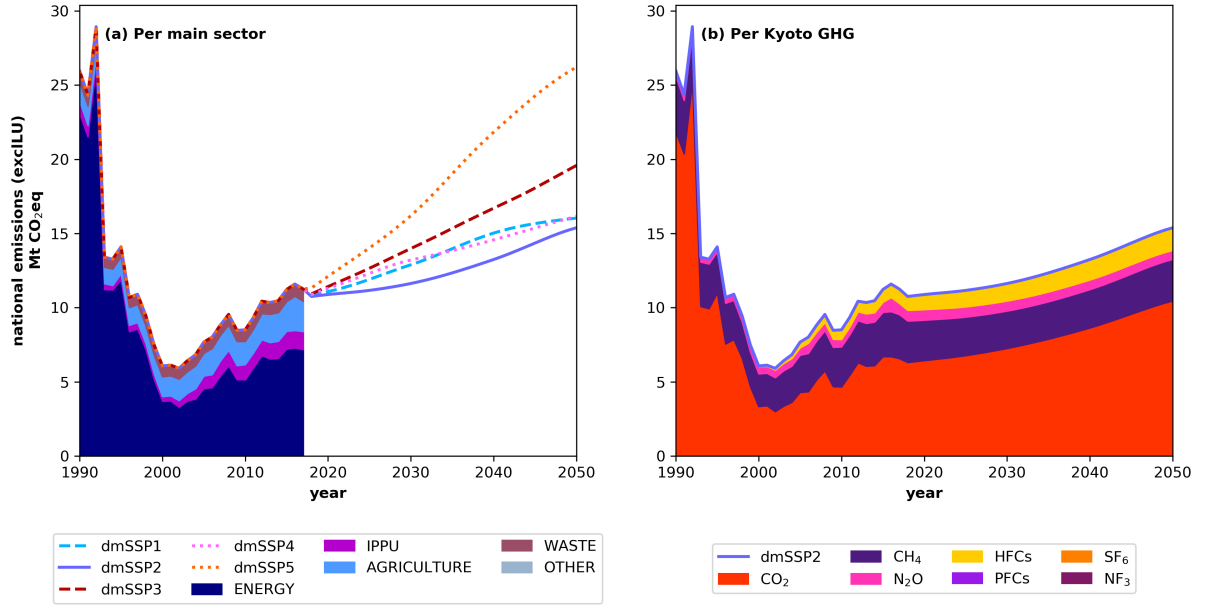


Figure 1: 'Stacked' timeseries of national emissions (exclLU) per main-sector (a) and Kyoto GHG (b). No information available on the sectoral contributions after 2017.

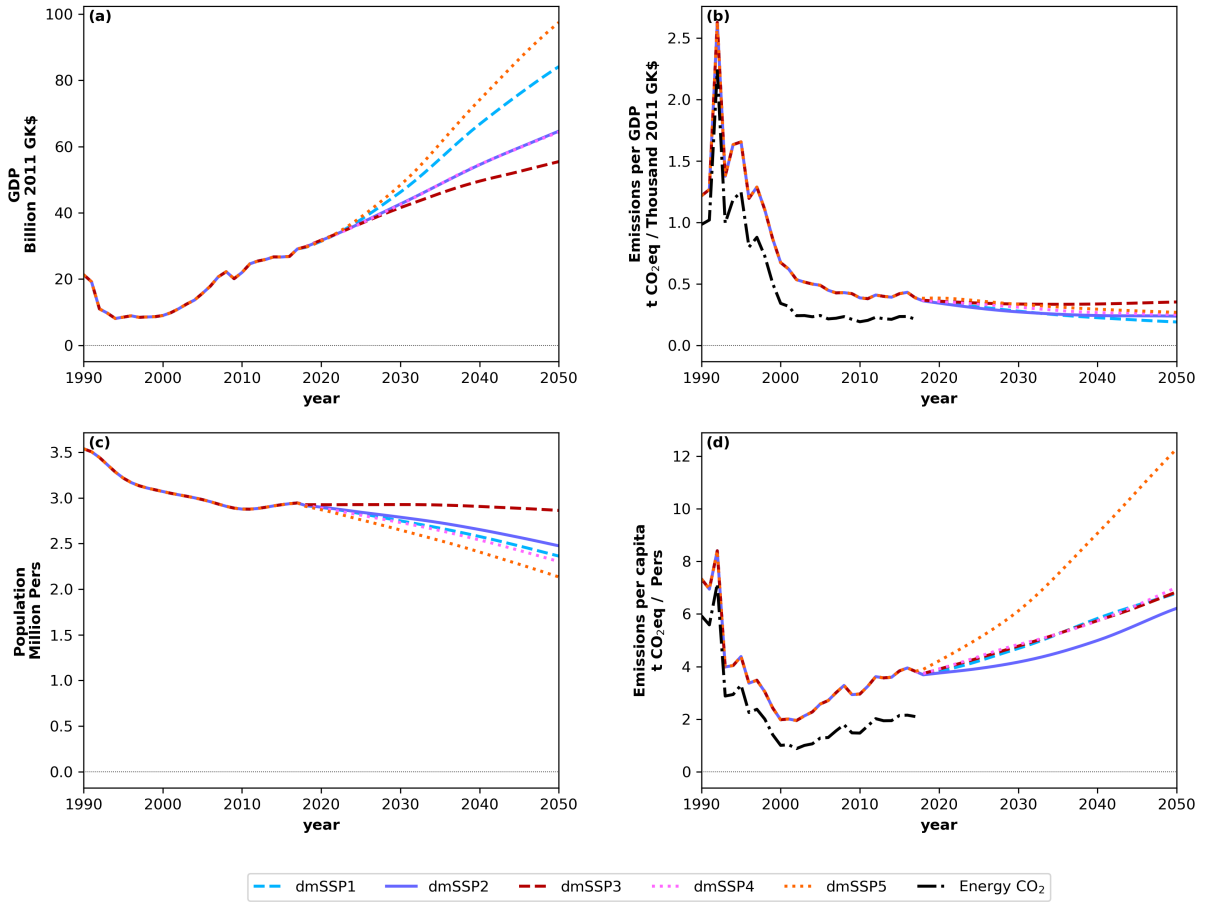


Figure 2: Timeseries of national GDP (a) and population (c), and Kyoto GHG emissions (exclLU, exclBunkers) per unit of GDP (b) or per capita (d).

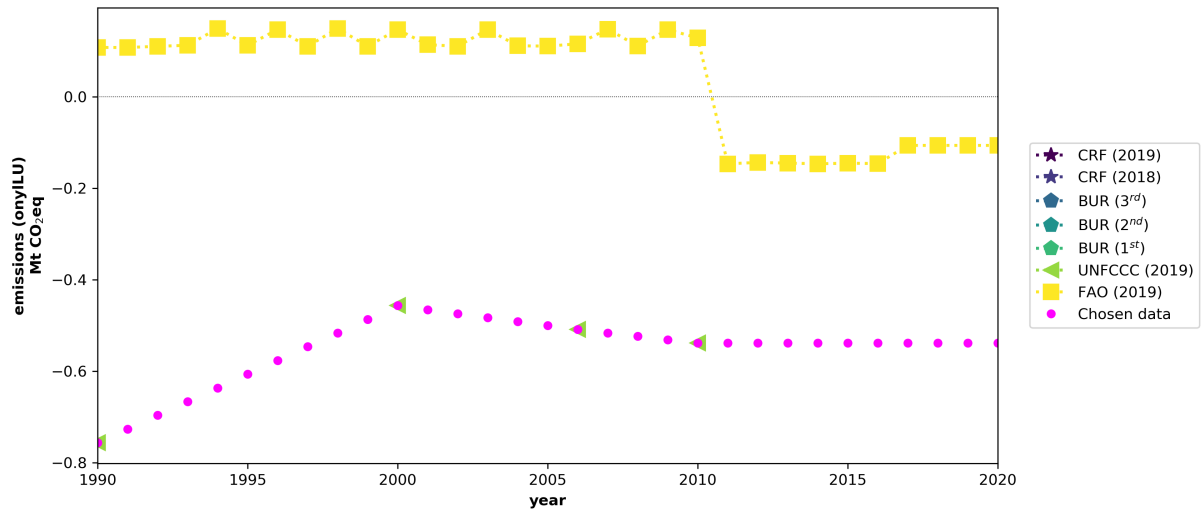


Figure 3: Timeseries of emissions from LULUCF (CO_2 plus CH_4 and N_2O) as available from different data-sources. Indicated in pink are the 'chosen' data, as used in our assessment of Armenia's NDC (if needed). The pink timeseries was inter- and / or extrapolated (interpolation: linear, extrapolation: constant).

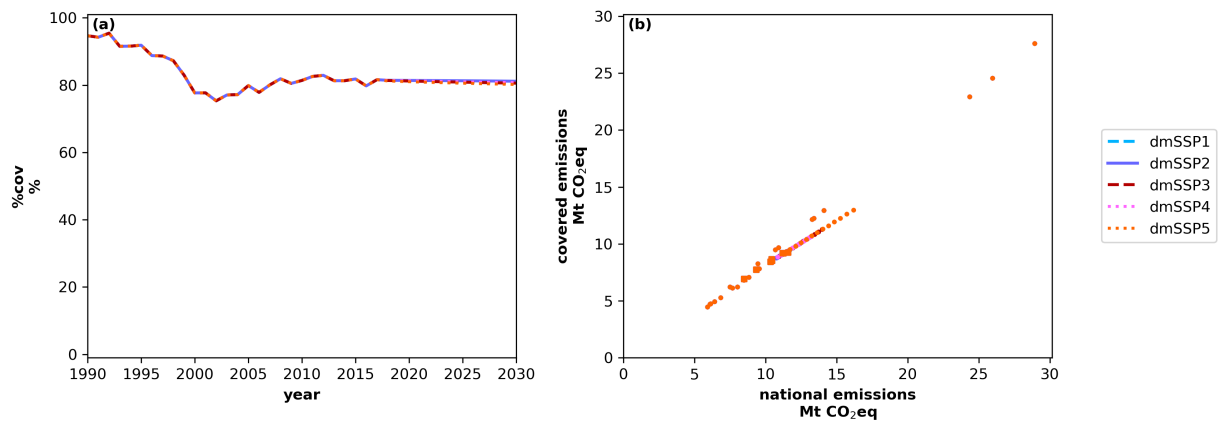


Figure 4: Timeseries of Armenia's national emissions (exclLU) and the share of emissions that is assumed to be covered by Armenia's mitigation target.

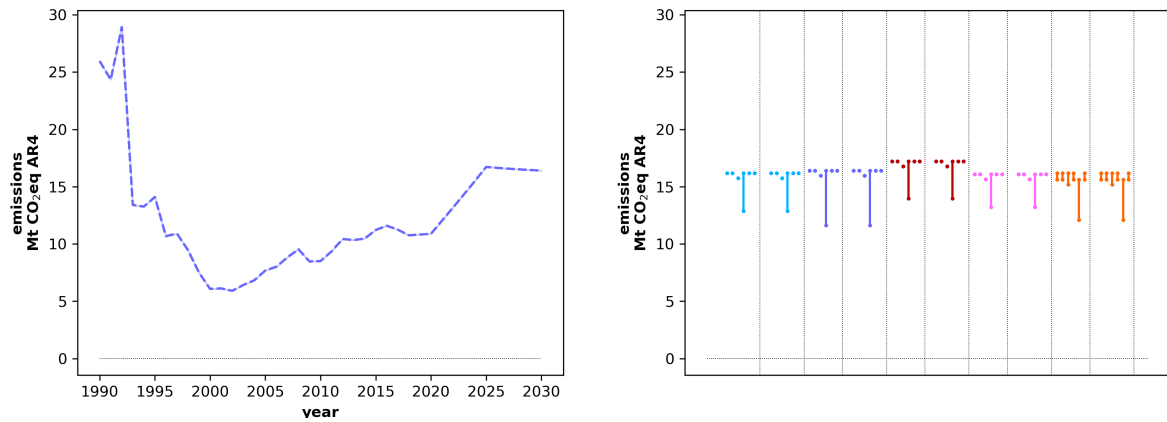


Figure 5: Quantified mitigation targets (based on different input data and calculation options). Vertical lines: conditionality / range; colour coded: dmSSP1–5; first / second set of six: prio NDCs / SSPs; set of six: coverage 100, lulucf unfccc, lulucf fao, bl uncondi, const emi, estimated coverage.