



Anthropogenic Greenhouse Gases

04/2015

Greenhouse gases covered by the Kyoto Protocol and the CO ₂ Act	Residence time in atmosphere ^{1,2} (in years)	GWP ^{2,3}	Share in total greenhouse gas emissions, excl. deforestation ⁴
Carbon dioxide (CO₂) <ul style="list-style-type: none"> Combustion of fossil thermal fuels and motor fuels (petroleum, natural gas, coal), cement production Deforestation/fire clearing in the tropics 	100–150	1	Globally ca. 73%, Switzerland ca. 82%
Methane (CH₄) <ul style="list-style-type: none"> Agriculture (livestock and fertilisation) Waste management (landfills, composting/fermentation, wastewater treatment) Use of fossil fuels 	12	25	Globally ca. 17%, Switzerland ca. 10%
Nitrous oxide (N₂O) <ul style="list-style-type: none"> Agriculture (soils and fertilisation) Smaller contributions from energy conversion, industry, and wastewater treatment 	114	298	Globally ca. 8%, Switzerland ca. 5%
Synthetic greenhouse gases:			Globally ca. 2%, Switzerland ca. 3%
Hydrofluorocarbons (HFC) <ul style="list-style-type: none"> Cryogenic agents, foaming agents, propellants in aerosol sprays, solvents 	0.3–270	12–14'800	
Perfluorinated carbon compounds (PFC) <ul style="list-style-type: none"> Production of semiconductors, solvents, heat carrier 	2'600–50'000	7'390–12'200	
Sulphur hexafluoride (SF₆) <ul style="list-style-type: none"> High voltage insulators, aluminium and magnesium casting, production of semiconductors 	3'200	22'800	
Nitrogen trifluoride (NF₃) <ul style="list-style-type: none"> Electronics industry 	740	17'200	
Greenhouse gases not covered by the Kyoto Protocol and the CO₂ Act			
Chlorofluorocarbons (CFC and halocarbons) <ul style="list-style-type: none"> Use restricted/prohibited by the Montreal Protocol because of ozone layer destruction; in Switzerland emissions only from existing cooling/fire-extinguishing systems and foams 	1.3–1'700	Up to more than 10'000	Decreasing tendency thanks to politics for the protection of the ozone layer
New climate-relevant substances			
Hydrofluorether (HFE) <ul style="list-style-type: none"> Solvents, heat carriers 	0.2–136	11–14'900	Increasing tendency
Sulphuryl fluoride (SO₂F₂)⁵ <ul style="list-style-type: none"> Pesticide 	36	4'780	

¹ Residence time in atmosphere: Time period after which 63.2% of the substance's initial amount left the atmosphere.

² Source: Table 2.14 (Errata), IPCC AR4 (2007, Working Group 1). These values are also used for the greenhouse gas inventory according to the UNFCCC guidelines.

³ Global Warming Potential (GWP): Relative measure of how much heat is trapped in the atmosphere by the different greenhouse gases (relative to CO₂).

⁴ Source: Switzerland's greenhouse gas inventory 2015 and World Resources Institute (WRI, data of 2011).

⁵ Papadimitriou et al. (2008, J. Phys. Chem. A, 112, 12657–12666) and Mühle et al. (2009, J. Geophys. Res., 114, D05306).