
***GREENHOUSE GAS INVENTORY
METHODOLOGY. FAQ***

2011, June version

Contents

Contents	1
1. The Spanish Inventory System.....	2
2. Inventory structure	3
3. Emissions covered by the European Union Trading Scheme (EU ETS) and non-ETS emissions.....	6
4. Base Year and reference emissions.....	7
5. Global Warming Potential. CO ₂ - equivalent.....	8

1. The Spanish Inventory System

The Spanish Inventory System (SEI, in Spanish) contains data on anthropogenic emissions of greenhouse gases (GHG) and other atmospheric pollutants, and the CO₂ absorption capacity of sinks.

It is the official inventory used to determine the state of compliance with the obligations assumed by the Spanish State under international conventions on climate change (Kyoto Protocol) and other pollutants covered by the Geneva Convention on Long-Range Transboundary Air Pollution and the National Emission Ceilings Directive.

In Spain, the GHG inventories are prepared on the basis of the CORINE-AIRE inventory (a translation of the European CORINAIR project currently coordinated by the European Environment Agency) and the emissions data prepared by the Environment Ministry for the Spanish State, which is broken down by autonomous region in the CORINAIR project. This data has been harmonised with the data produced by the Intergovernmental Panel on Climate Change (IPCC) and the European Monitoring and Evaluation Programme (EMEP) of the United Nations Economic Commission for Europe (UNECE).

The Directorate General of Environmental Quality and Evaluation (DGCEA) of the Spanish Ministry of Environmental, Rural and Marine Affairs (MARM) is the National Authority for the National Inventory System of Atmospheric Pollutant Emissions. The DGCEA incorporates the Strategic Environmental Information Unit (UIAE), which is charged with preparing the inventory and processing the information compiled from different sources.

The DGCEA obtains the information required to prepare the Inventory from ministerial departments and public bodies with competence over sectors and activities that generate (or could generate) atmospheric pollutant emissions.

The process of preparing the Inventory comprises several stages, including: identifying key categories, selecting methods, compiling information, processing information, presenting results and evaluating uncertainties, and validating the Inventory.

2. Inventory structure

The data in the GHG emissions inventory is presented using the IPCC format (seven sectors presented using the Common Reporting Format, or CRF) as is all communication between Member States and the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The categories that make up the National Inventory are as follows:

1. Energy processing

Covers GHG emissions generated by combustion activities (which account for 99% of emissions) such as energy sector industries (power plants, oil refineries, fuel transformation), transport, manufacturing and construction industries, and combustion in the residential, service and other sectors. The remaining 1% are fugitive emissions from fuels.

1.A. Combustion activities

1.A.1. Energy sector: covering emissions from burning fuel in energy production industries and for fuel extraction.

1.A.2. Manufacturing and construction industries: covering emissions from industrial fuel burning. This includes combustion emissions for heat and electricity generation for use within the industries themselves.

1.A.3. Transport: covering emissions from the combustion and evaporation of fuels generated by all transport activities (excluding military transport). This includes emissions from civil aviation; road, rail and sea transport; and other transport activities, such as piping (compressors).

1.A.4. Other sectors: covering emissions from fuel combustion in the residential, commercial and institutional sectors, and in stationary installations and mobile machinery used in agriculture, forestry and fishing.

1.A.5. Others: covering all other emissions from fuel combustion not specified above, such as emissions from military activities.

1.B. Fugitive fuel emissions

1.B.1. Solid fuels: covering intentional and unintentional emissions from the extraction, processing, storage and transportation of solid fuels to the point of final use.

1.B.2. Oil and natural gas: covering fugitive emissions from all oil and natural gas activities such as equipment leaks, evaporation loss, ventilation, flaring and accidental emissions.

2. Industrial processes

This covers GHG emissions from industrial processes (excluding direct combustion emissions). The following industrial activities are included:

- 2.A. Mineral products
- 2.B. Chemical industry
- 2.C. Metal production
- 2.D. Other industries
- 2.E. Production of halocarbons and SF₆
- 2.F. Use of halocarbons and SF₆
- 2.G. Others

3. Use of solvents and other products

This covers GHG emissions from a wide range of production processes and consumption involving organic solvents (such as in paints, dry cleaning and electronics) or processes using HFCs, PFCs, SF₆, N₂O or NH₃.

4. Agriculture

This covers GHG emissions from all activities directly or indirectly related to arable and livestock farming (excluding combustion activities in those sectors).

- 4.A. Enteric fermentation
- 4.B. Manure management
- 4.C. Rice cultivation
- 4.D. Agricultural land
- 4.E. Prescribed burning of savannahs
- 4.F. Field burning of agricultural residues
- 4.G. Others

5. Land-use change and forestry

This covers emissions and absorptions (capture) of atmospheric CO₂ resulting from changes in different carbon deposits related to land use and changes in land use and forestry (such as woodland, arable land, pastureland, etc.) and emissions of other greenhouse gases (CH₄ and N₂O) caused by forest fires.

These emissions and absorptions are calculated for the whole of Spain and are not broken down by autonomous region.

6. Waste

This covers GHG emissions resulting from the processing and disposal of solid waste and the treatment of waste water.

6.A. Solid waste disposal on land

6.B. Wastewater handling

6.C. Waste incineration

6.D. Others: muck spreading, production of compost and biogas, and production of fuel from waste products.

7. Others

This covers GHG emissions generated by the extraction of geothermal energy. These emissions are currently zero for Spain and Catalonia.

3. Emissions covered by the European Union Trading Scheme (EU ETS) and non-ETS emissions

In line with current policy on combating global warming, emissions of greenhouse gases (GHG) are usually divided into two main groups:

- **EU ETS emissions: emissions from installations covered by the Emission Trading Directive** (EU ETS emissions) which are covered by Law 1/2005 (Royal Legislative Decree 5/2005 and Law 13/2010) which transpose Directives 2003/87/EC and 2009/29/EC respectively. The emissions trading system is intended to help achieve the obligations arising from the United Nations Framework Convention on Climate Change and the Kyoto Protocol in Europe. The following industrial sectors are included: combustion, electricity generation, steel, ceramic, lime, cement, paper, oil refining, glass and (recently) the chemical industry.
In consideration of these obligations, the emissions data from the sectors covered by the Directive are made available four months after the end of the preceding year.
- **Non-trading emissions:** all other emissions, or emissions that are not covered by the Emission Trading Scheme (non-EU ETS emissions). These are generated by all other emission sources, split into the following groups: industrial sector (not covered by the Directive), consumption of fossil fuels in the residential, institutional and service sectors, fugitive emissions, solvent use, transport, waste and agriculture.

4. Base Year and reference emissions

The base year is usually a reference year for determining GHG emission reduction targets.

To determine the objectives of the Kyoto Protocol, and specifically the Framework Plan for Climate Change Mitigation in Catalonia (PMMCC), 1990 was chosen as the base year for emissions of CO₂, CH₄ and N₂O, and 1995 as the base year for fluorinated gases, using the data available at that time.

The PMMCC Base Year for Catalonia is therefore 40,331,170 tons of CO₂-equivalent. This value is fixed, allowing us to determine how close we are to achieving the emission reduction target set.

For Spain as a whole, the Kyoto Protocol base year emissions total 289,773,205 tons of CO₂-equivalent.

Every year, as a result of improvements to the method used to prepare the national emissions inventory, the time series (emissions from 1990 to the last available year) may be changed. For this reason, the base-year emission value (the 1990 emissions of CO₂, CH₄ and N₂O and the 1995 emissions of fluorinated gases) may be changed. Nonetheless, and in accordance with European practice, updating this value does not mean updating the reduction target.

The 1990 emissions in Catalonia total 37.6 million tons of CO₂-equivalent and are below the base year because emissions of fluorinated gases in 1990 were lower than in 1995. The 1990 emissions value may also be changed in future versions of the inventory if methodological improvements are made that require the entire series to be amended.

5. Global Warming Potential. CO₂ - equivalent

GHGs differ in their warming influence (radiative forcing) on the global climate system due to their different radiative properties and lifetimes in the atmosphere. These influences may be expressed through a common metric based on the radiative forcing of CO₂. CO₂-equivalent emissions constitute a reference value and a useful metric for comparing different GHG emissions.

The definition of carbon dioxide equivalent (CO₂ eq) is the amount of CO₂ emission that would cause the same radiative intensity as a given emitted amount of well mixed greenhouse gases or a combination of greenhouse gases, multiplied by their Global Warming Potential (GWP) to account for the time they remain in the atmosphere.

Emissions of the six greenhouse gases included in Annex I to the Kyoto Protocol are added together as carbon dioxide equivalent (CO₂ eq), weighting the mass of each gas in accordance with the tables of Global Warming Potential (GWP) provided by the IPCC in 1995.

GLOBAL WARMING POTENTIALS

GAS	FORMULA	IPCC WARMING POTENTIALS 1995 ¹
CARBON DIOXIDE	CO ₂	1
METHANE	CH ₄	21
NITROUS OXIDE	N ₂ O	310
HYDROFLUOROCARBONS		
HFC-23	CHF ₃	11700
HFC-32	CH ₂ F ₂	650
HFC-41	CH ₃ F	150
HFC-43-10MEE	C ₅ H ₂ F ₁₀	1300
HFC-125	C ₂ HF ₅	2800
HFC-134	C ₂ H ₂ F ₄ (CHF ₂ CHF ₂)	1000
HFC-134A	C ₂ H ₂ F ₄ (CH ₂ FCF ₃)	1300
HFC-152A	C ₂ H ₄ F ₂ (CH ₃ CHF ₂)	140
HFC-143	C ₂ H ₃ F ₃ (CHF ₂ CH ₂ F)	300
HFC-143A	C ₂ H ₃ F ₃ (CF ₃ CH ₃)	3800
HFC-227EA	C ₃ HF ₇	2900
HFC-236FA	C ₃ H ₂ F ₆	6300
HFC-245CA	C ₃ H ₃ F ₅	560
PERFLUOROCARBONS		
PERFLUOROMETHANE	CF ₄	6500
PERFLUOROETHANE	C ₂ F ₆	9200
PERFLUOROPROPANE	C ₃ F ₈	7000
PERFLUOROBUTANE	C ₄ F ₁₀	7000
PERFLUOROCYCLOBUTANE	C ₄ F ₈	8700
PERFLUOROPENTANE	C ₅ F ₁₂	7500
PERFLUOROHEXANE	C ₆ F ₁₄	7400
SULPHUR HEXAFLUORIDE	SF ₆	23900

Source: IPCC's Second Assessment Report, 1995