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Highlights

Key Figures on Climate
France and Worldwide
2015 Edition

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Key Figures on Climate France and Worldwide

Foreword

As with previous editions, the 2015 edition of "Key Figures on Climate" has been prepared within the context of the 20th Conference of the Parties on Climate Change (COP20) held in Lima from the 1st to the 12th of December 2014.

This latest version has been updated and expanded compared to the 2014 edition. Thus, European data now cover 28 Member States to take into account the accession of Croatia to the European Union on the 1st of July 2013. Moreover, the comparison of greenhouse gas emissions under "territorial" and "carbon footprint" approaches is based on the latest figures, dating from 2010. Furthermore, a section has been added on climate finance.

This publication, through its organization and the choice of covered topics, is aimed at informing the widest audience possible about climate change, its geophysical properties, causes and effects as well as the international policy frameworks established to limit its progression.

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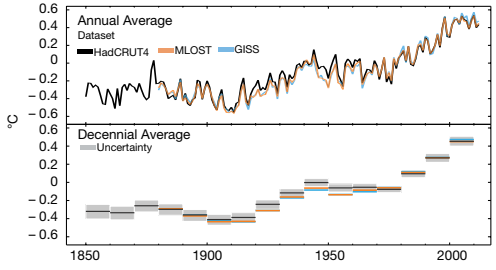
Estimated Global Atmospheric Temperature since 1850

Estimated global mean temperature from 1850 to 2012 compared with the reference period average 1961-1990

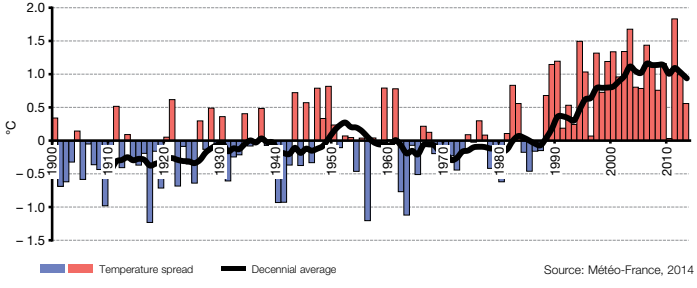


Source: IPCC, 1st working group, 2013

> In 2013, the average temperature over land and ocean is 0.63°C ± 0.2°C higher relatively to the 20th century average.

> In metropolitan France, the average temperature has increased by 0.7°C over the century in the northeastern part of the country. The increase is even larger in the southwestern part where it reached 1.1°C.

Mean temperature evolution in Metropolitan France since 1900 compared with the reference period average 1961-1990

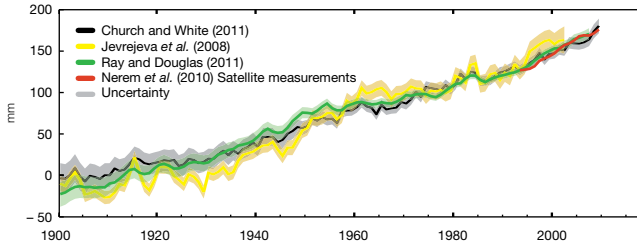


Source: Météo-France, 2014

> The year 2013 was not exceptional in France. However, at a global scale, it tied with 2007 as the sixth warmest year since 1850.

Continuous Increase in Sea Level since the 1900s

Global average sea level compared with the reference period average 1900-1905



Source: IPCC, 1st working group, 2013

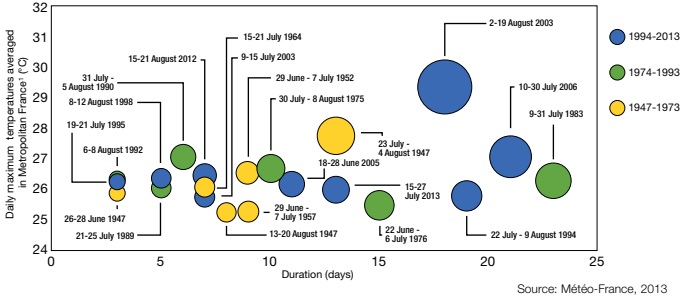
> The global average sea level increased by **1.7 ± 0.3 mm/year** over the 1901-2010 period.

> The rise in sea level has further increased during the last decades to reach 3.2 ± 0,4 mm/year over the 1993-2010 period (satellite data).

Extreme Weather Events

> A weather event is classified as extreme when it substantially exceeds baseline trends. Climate change modifies the frequency, intensity, scale, duration and time of occurrence of extreme events (tornadoes, hurricanes, as well as heat waves or abnormally heavy rainfalls).

Heat waves in France between 1947 and 2013



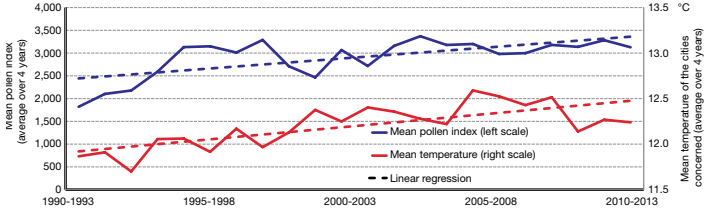
Source: Météo-France, 2013

> France experienced a heat wave from July 15th to July 27th 2013 with an initial peak from July 20th to 23th and a second from July 25th to July 27th. Although this heat wave was of moderate intensity (lower than in 1983, 2003 or 2006), its thirteen-day duration places it among the longest extreme events since 1947.

1. The average is based on a selection of thirty cities in Metropolitan France. The surface of each circle represents the intensity of the heat wave, which depends on its duration and its maximum temperatures.

Evolution of amounts of birch pollen in France

Four-year annual average of birch pollen amounts and average temperature from July to June for 6 cities in France, from 1989 to 2014

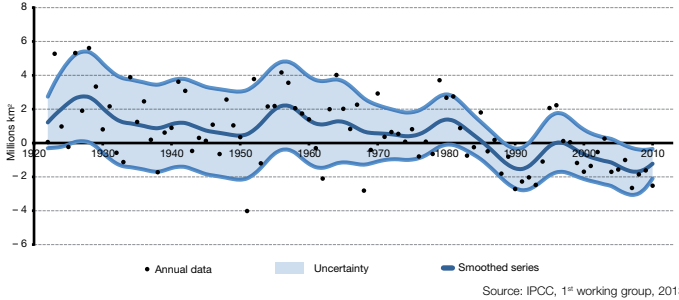


Source: French National Network of Aerobiological Observation, 2014

> The amounts of birch pollen released into the air in March and April of a given year depend on the temperature and weather observed since July of the previous year. Global warming tends to make the flowering and the pollination of plants occur earlier.

Melting Ice

Northern Hemisphere April snow cover variability and change compared with 1971-2000 average

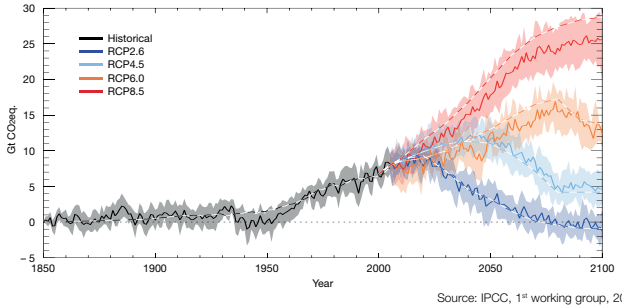


Source: IPCC, 1st working group, 2013

> In the Northern Hemisphere, the snow cover has decreased over the 20th century. The pace of this decline has increased during the last decades. The IPCC estimates that the spring snow cover has decreased by 8% in surface over the 1970-2010 period, compared with the 1922-1970 period. The decline of the snow cover decreases the Earth's albedo – i.e. its ability to reflect solar energy – and thus contributes to rising temperatures.

IPCC Scenarios

Projection of fossil fuel emissions according to the IPCC's four GHG concentrations pathways (RCPs)

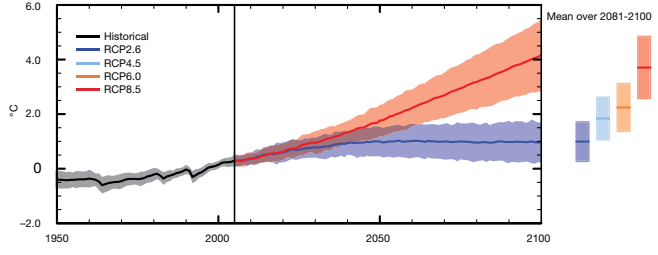


Source: IPCC, 1st working group, 2013

> The IPCC released its First Assessment Report (FAR) in 1990 and will release its complete fifth report (AR5) between 2013 and 2014. In each report, the IPCC publishes climate projections based on different scenarios. For the AR5, four Representative Concentration Pathways (RCPs) were chosen. Climate simulations and socio-economic scenarios were elaborated based on these pathways.

Projected Rise of Global Temperature

Projection of global average surface temperature change according to different RCPs

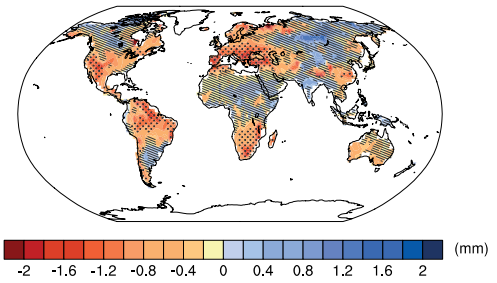


Source: IPCC, 1st working group, 2013

> RCPs produce different results. For instance, climate simulations using the RCP 4.5, which calls for a stabilization of the concentration of GHG emissions at 660 ppm eq. CO_2 after 2011, forecast a rise of the mean temperature by +1.8 ±0,5°C between 2081 and 2100.

Change of Soil Moisture at the end of the 21st century

Change in annual mean soil moisture between 2081 and 2100 compared with 1985-2005 period according to RCP 6.0

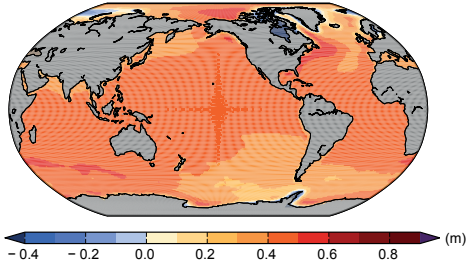


Source: IPCC, 1st working group, 2013

The soil moisture is the mass of water in all phases in the uppermost 10 cm of the soil.
Hatched areas indicate that the average expected change is small compared to typical climatic variations. Stippled areas indicate that the change is more important and there is a higher certainty of climate simulations.
Red areas have higher chance to be affected by increased periods of drought than today.

Projections of Sea Level Rise

Projections of sea level rise in 2100 compared with the year 2000 according to RCP 2.6



Source: IPCC, 1st working group, 2013

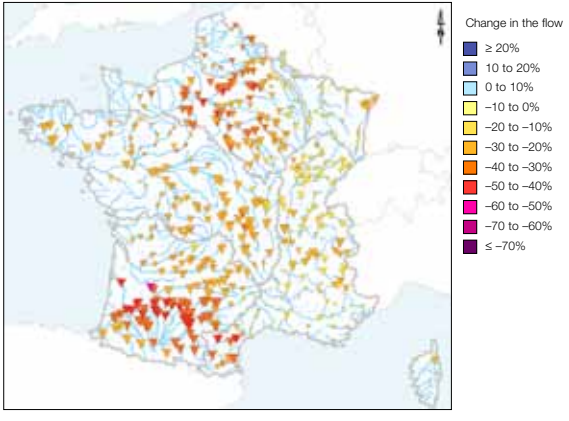
> The main drivers of growth in sea level are the thermal expansion and the melting of terrestrial ice (glaciers, polar ice caps...).
> The increase in sea level is likely to cause heavy migration of populations, since more than a billion people live in low-lying coastal regions.

Consequences for France

Number of additional abnormally warm days in the future (IPCC's RCP 4.5 scenario)

Source: Drias *les futurs du climat*, 2014

Change in the average annual flow of rivers between the 1961-1990 and 2046-2065 periods

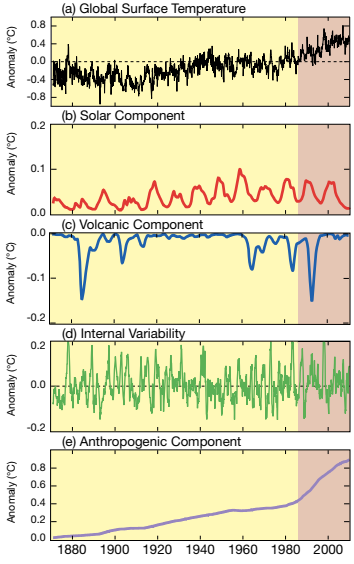


The larger the triangles, the more convergent the results of the different simulations are.

Source: Project Explore 2070, Medde

> Overall, all river flows will be reduced. While low water levels will be more severe in the South, no significant change in floods is estimated. The temperature of surface waters will keep rising.

Change in the Global Temperature since 1900 and Contributions of Natural and Anthropogenic Factors



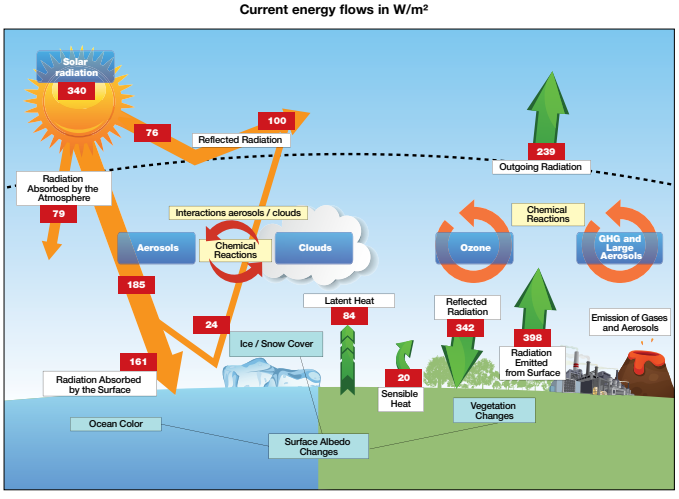
Source: IPCC, 1st working group, 2013

> A combination of natural and anthropogenic factors explains changes in global temperature:

- An internal variability, which explains change over a few years but does not contribute to a long term trend (for instance, the "El Niño" phenomenon);
- Volcanic activity, as aerosol emissions tend to decrease the temperature;
- Variations in solar activity;
- GHG emissions, which are the main anthropogenic contribution.

> According to the IPCC, the average rise in temperature since 1965 is mainly due to GHG emissions.

Role of the Atmosphere in the Greenhouse Effect



The sun supplies energy through its rays to the Earth. A portion of it is directly or indirectly reflected into space while the majority is absorbed by the atmosphere or the Earth's surface. The warmth at the surface of the Earth is principally due to greenhouse gases, which trap the main part of surface radiation.

Source: IPCC, 1st working group, 2013

Human Activities and the Greenhouse Effect

> Increased anthropogenic GHG emissions in the atmosphere augment the part of the energy reflected to the surface, destabilizing the system, and thus causing a rise of the Earth's temperature.

> The change of the radiation induced by an element, compared with a base year, is called radiative forcing. A positive **radiative forcing** indicates a positive contribution to global warming.

> Some human activities such as the emission of aerosols contribute to reducing the energy return towards the surface caused by GHGs but do not compensate it. In 2013, compared with 1750, this radiative forcing is estimated at **–0.45 ± 0.5 W/m²**, while anthropogenic GHGs radiative forcing is **+2.90 ± 0,29 W/m²**. Thus, the total anthropogenic radiative forcing reaches **+2.55 ± 1.1 W/m²** in 2013 compared with 1750.

Greenhouse Gases

> GHGs other than water vapor make up less than 0.1% of the atmosphere. Water vapor, which fluctuates from 0.4% to 4% in volume, is the main greenhouse gas. It is mainly from natural origins: human activities have little impact on its fluctuations.

Anthropogenic Greenhouse Gases

	CO_2	CH_4	N_2O	HFC	PFC	SF_6	NF_3
Atmospheric concentration 2011 (in 2005 between brackets)	390 ppm (379 ppm)	1,803 ppb (1,774 ppb)	324 ppb (319 ppb)	>119 ppt (>67 ppt)	>83 ppt (>79 ppt)	7.3 ppt (5.6 ppt)	<1 ppt
Lifespan in the atmosphere		~ 9 years	131 years	between 0.1 and 270 years	between 2,000 and 50,000 years	3,200 years	500 years
Global Warming potential (total over 100 years)	1	28-30	265	[1.4; 14,800]	[6,630; 11,100]	23,500	16,100
Anthropogenic sources	Burning of fossil fuels and tropical deforestation	Landfills, agriculture, livestock and industrial processes	Agriculture, industrial processes, use of fertilizer	Aerosols, refrigeration, aluminium smelting			Manufacture of electronic components
Change in radiative forcing due to anthropogenic emissions in 2011 since 1750 (W / m²) (in 2005 between brackets)	+1.88 (+1.66)	+0.50 (+0.48)	+0.18 (+0.16)	+0.02 (+0.01)	+0.05 (+0.05)	+0.004 (+0.003)	+0.0002 (+0.0001)

ppm = part per million, ppb = part per billion, ppt = part per trillion.

Source: IPCC, 1st working group, 2013

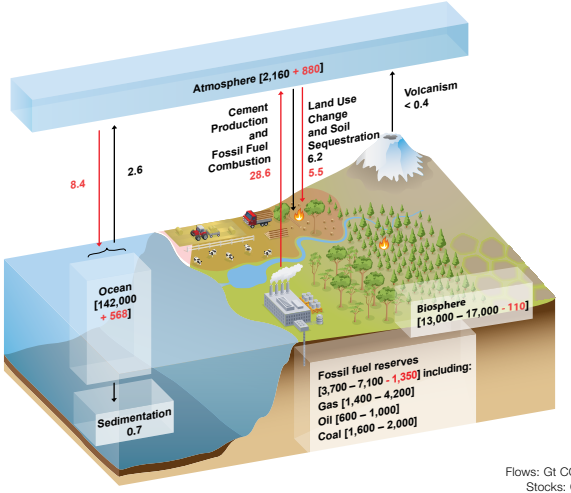
> **The Global Warming Potential (GWP)** is the ratio between the energy reflected towards the surface over 100 years by 1 kg of the gas and that which would be reflected by 1 kg of CO_2. The GWP depends on the concentration and lifespan of each gas. E.g.: 1 kg of CH_4 and between 28 and 30 kg of CO_2 would heat the atmosphere equally over the century following their release.

> **Ozone** – especially in the troposphere – is also a GHG whose radiative forcing increased by **+0.4 W/m²** since 1750.

> Ozone depleting gases governed by the Montreal Protocol (notably **CFCs** and **HCFCs**) are also GHGs. Their total radiative forcing increased by **+0.36 W/m²** since 1750.

Although CO_2 has the smallest global warming potential of all GHGs, it has contributed the most to global warming since 1750.

Simplified CO_2 Cycle during the 2000s



Units:
Flows: Gt CO_2e/year
Stocks: Gt CO_2e

This figure shows (i) between square brackets the size of the pre-industrial reservoirs in billions of tons of CO_2 equivalent in black and their variation over the 1750-2011 period in red ; (ii) arrows represent the annual carbon fluxes between reservoirs. Pre-industrial flows are in black. Flows linked with the development of anthropogenic activities between 2000 and 2009 are in red.

Source: based on IPCC, 1st Working Group, 2013

> Four large reservoirs or "stocks" allow the storage of carbon in different forms:

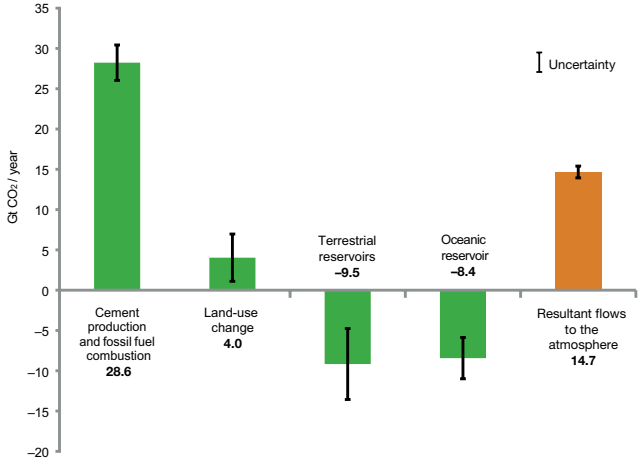
- **Atmosphere:** gaseous CO_2;
- **Biosphere:** organic material and living things including forests;
- **Ocean:** calcium, dissolved CO_2;
- **Subsoil:** rocks, sediments, fossil fuels.

> Flows of carbon between these reservoirs constitute the natural carbon cycle which is disrupted by human activities which change the size of the flows or create new ones. E.g.: the burning of fossil fuels (coal, oil…).

> Over the 2000s, among the 340 billion tons of CO_2 (Gt CO_2) liberated by human activities from the biosphere and the lithosphere, 160 Gt have been absorbed by the atmosphere and 90 Gt by the oceans. The atmosphere is the most affected by human activities: the quantity of carbon absorbed has increased by 40% compared to the pre-industrial era.

Imbalance between Emissions and Storage Capacity

Annual changes in CO_2 over 2000-2009 by source and by reservoir



Source: IPCC, 1st working group, 2013

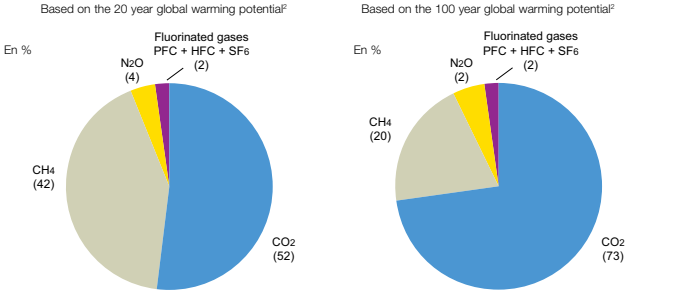
> Since the increase in industrial activities, the terrestrial and oceanic reservoirs have absorbed half of the human-related emissions. The remaining emissions persist in the atmosphere, which has led to **increased concentration of greenhouse gases**.

> Forests are the largest terrestrial carbon reservoir. They store approximately 9.2 Gt CO_2e net emissions per year, equivalent to 33% of global GHG emissions.

> In France, the carbon flow in the forest biomass is estimated at 17.1 million tons of carbon per year, accounting for 17% of national emissions of fossil carbon (INRA, 2006).

> Deforestation leads to GHG emissions through the burning and decomposition of organic matter. These emissions represent approximately 11% of yearly anthropogenic GHG emissions (source: Van der Werf *et al.* 2009, Nature Geoscience).

Global GHG[1] Emissions by Gas in 2010

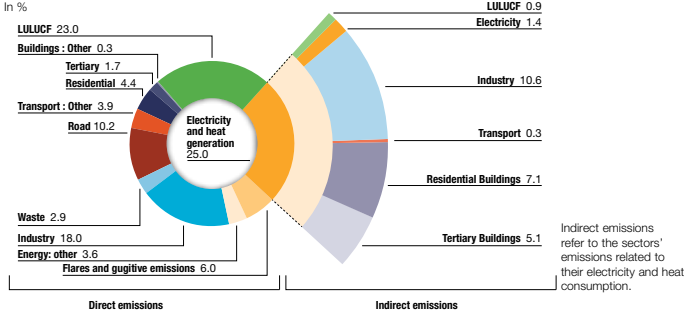


Source: IPCC, 3rd working group, 2014

> Emissions of the six greenhouse gases[2] covered by the Kyoto Protocol have increased by 70% since 1970 and by 24% since 1990, reaching **49 Gt CO_2e in 2004.**

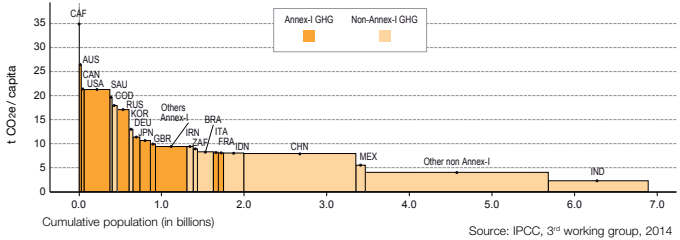
CO_2: carbon dioxide; N_2O: nitrous oxide; CH_4: methane; HFC: hydrofluorocarbons; PFC: perfluorocarbons; SF_6: sulphur hexafluoride
1. Including emissions due to Land Use, Land Use Change and Forestry (LULUCF).
2. The Global Warmng Potential (GWP) allows for a comparison of the contribution of different greenhouse gases on the global warming, for a given period. The period considered usually covers 100 years. However, this choice underestimates the short-term effect of certain gases. Therefore, a 20 year period is also commonly considered.

Global GHG Emissions by Sector in 2010



Source: IPCC, 3rd working group, 2014

Regional Distribution of GHG Emissions[1] per Capita in 2010

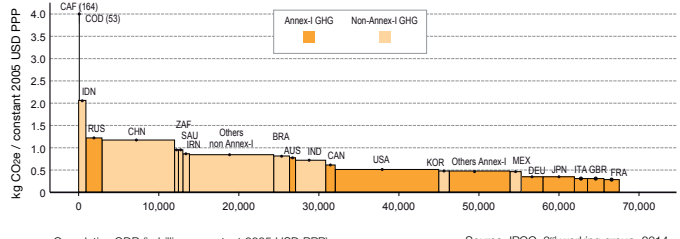


Source: IPCC, 3rd working group, 2014

Countries are named according to ISO 3166 Standard.

> In 2010, Annex I countries of the UNFCCC[2] represented 18% of the world population, 54% of global GDP and produced 36% of all the GHG emissions. In Annex I countries, the average GHG emissions per capita was 14.6 t CO_2e, approximately three times the average in non-Annex I countries. This gap has narrowed since 2004, when it was a factor four.

Regional Distribution of GHG Emissions[1] per Unit of GDP in 2010



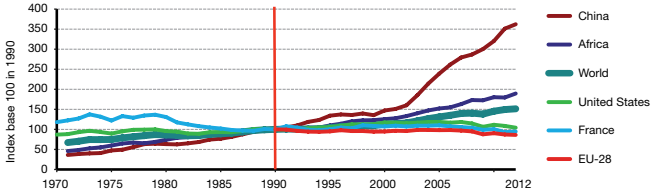
Source: IPCC, 3rd working group, 2014

Countries are named according to ISO 3166 Standard.

> Measured in constant 2005 USD PPP, and adjusted for purchasing power parity (PPP), the production of one unit of GDP in the Annex I countries resulted in GHG emissions that were on average 50% lower than in non-Annex I countries.

1. Including Land Use, Land Use Change and Forestry (LULUCF).
2. United Nations Framework Convention on Climate Change. Annex I includes the most developed countries in 1990.

CO_2 Emissions from Fuel Combustion Worldwide[1]



Source: International Energy Agency (IEA), September 2014

> In 2012, global CO_2 emissions from fuel combustion increased by 1.2 %, reaching 31.7 billion tons of CO_2 ($Gt\ CO_2$). These emissions grew at a higher rate in emerging countries, particularly in India (+6.8%) and in Brazil (+7.9%). With 8.3 Gt CO_2, China is by far the biggest emitter ahead of the United States (5.1 Gt CO_2). In 2012, these two countries alone emitted 42% of the CO_2 due to fuel combustion.

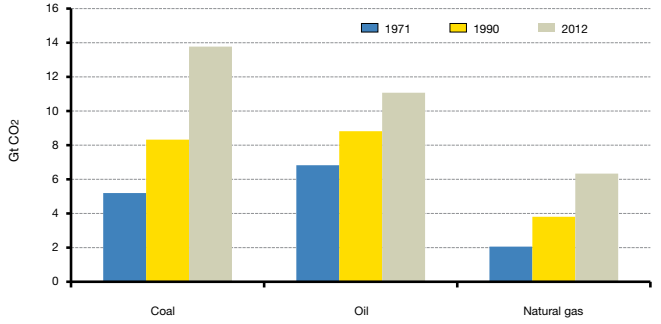
In Mt CO_2

	1990	2011	2012	Share in 2012 (%)	Change (%) 2012/2011	Change (%) 2012/1990
North America	**5,562**	**6,258**	**6,044**	**19.0**	**–3.4**	**+8.7**
of which: Canada	428	537	534	1.7	–0.5	+24.6
USA	4,869	5,288	5,074	16.0	–4.1	+4.2
Latin America	**608**	**1,164**	**1,225**	**3.9**	**+5.3**	**+101.5**
of which: Brazil	192	408	440	1.4	+7.9	+128.8
Europe and former USSR	**7,931**	**6,472**	**6,449**	**20.3**	**–0.4**	**–18.7**
of which: EU-28	4,068	3,548	3,505	11.0	–1.2	–13.8
EU-15	3,083	2,840	2,827	8.9	–0.5	–8.3
of which: Germany	950	742	755	2.4	+1.8	–20.5
Spain	205	270	267	0.8	–1.4	+29.9
France	**353**	**329**	**334**	**1.1**	**+1.6**	**–5.4**
Italy	397	393	375	1.2	–4.6	–5.7
United Kingdom	549	437	457	1.4	+4.8	–16.7
13 new EU members	985	707	678	2.1	–4.2	–31.2
of which: Russia	2,179	1,653	1,659	5.2	+0.4	–23.9
Africa	**545**	**978**	**1,032**	**3.3**	**+5.6**	**+89.4**
Middle-East	**583**	**1,646**	**1,720**	**5.4**	**+4.5**	**+194.9**
Far East	**4,842**	**13,276**	**13,766**	**43.4**	**+3.7**	**+184.3**
of which: China	2,278	8,000	8,251	26.0	+3.1	+262.2
South Korea	229	590	593	1.9	+0.5	+158.6
India	580	1,829	1,954	6.2	+6.8	+236.6
Japan	1,057	1,183	1,223	3.9	+3.4	+15.8
Oceania	**283**	**419**	**418**	**1.3**	**–0.1**	**+48.0**
Annex I countries	**13,890**	**13,337**	**13,141**	**41.4**	**–1.5**	**–5.4**
Non-Annex I countries	**6,464**	**16,874**	**17,513**	**55.2**	**+3.8**	**+170.9**
International marine and aviation bunkers[2]	**620**	**1,133**	**1,080**	**3.4**	**–4.7**	**+74.3**
World	**20,974**	**31,345**	**31,734**	**100.0**	**+1.2**	**+51.3**

Source: International Energy Agency (IEA), September 2014

1. Emissions from fossil fuel combustion for final use (transport, heating, etc.) or intermediary use (production of electricity, oil refining, etc.). These emissions are assessed by the IEA on the basis of national energy balances. Differences in perimeters and methods of computation (in particular in emissions factors) may be noted with chapters 3 and 4 where data is taken from the inventories of GHG emissions transmitted to the United Nations Framework Convention on Climate Change (UNFCCC).
2. International marine and aviation bunkers are excluded from national totals.

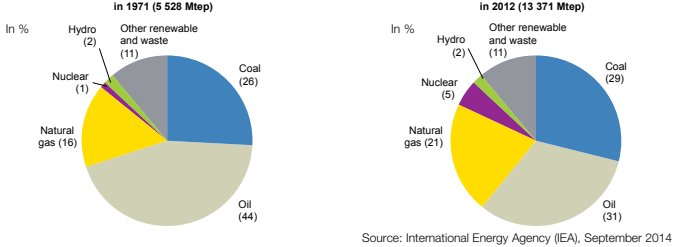
Change in Global Energy-related CO_2 Emissions by Fuel



Source: International Energy Agency (IEA), September 2014

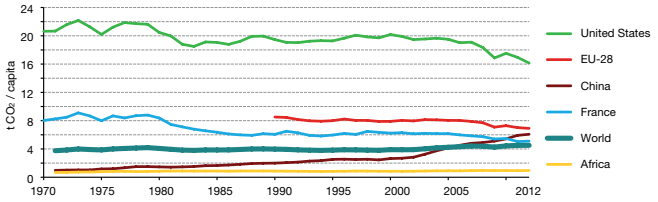
> Fossil fuels (coal, natural gas and oil) account for 82% of the global total primary energy supply (TPES) in 2012 (five points less than in 1971). In the EU-28, this figure drops to 74% and even 49% in France, due to the widespread use of nuclear generation. Worldwide, between 1971 and 2012, the share of oil in the energy mix fell by thirteen points while the share of natural gas rose by five points, the share of nuclear power by four points and the share of coal by three points. In 2011, coal was the second energy source after oil, providing 29% of the energy mix. Yet, it was the first CO_2 emitter (44%), because its emission factor is much higher than those of oil and gas (see page 33). The production of renewables has increased at the same pace as the TPES, so that its share in the global mix has not increased in forty years.

Global primary energy mix



Source: International Energy Agency (IEA), September 2014

Energy-related per Capita CO_2 Emissions Worldwide



Source: International Energy Agency (IEA), September 2014

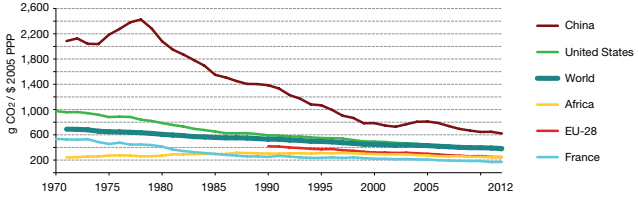
> In 2012, energy-related per capita CO_2 emissions amounted to 4.5 t CO_2/capita. They declined in Annex I countries (–1.9%), while they continued to grow fast in non-Annex I countries (+2.4%). Since 1990, they have tripled in China, reaching 6.1 t CO_2/capita in 2012. This is still slightly less than the average in the EU-28 (6.9 t CO_2/capita), but higher than in France (5.1 t CO_2/capita). In 2012, a French person emits thrice less CO_2 than an inhabitant of the USA (16.1 t CO_2/capita).

In t CO_2/capita

	1990	2011	2012	Change (%) 2012/2011	Change (%) 2012/1990
North America	**15.2**	**13.5**	**13.0**	**–4.2**	**–14.9**
of which: Canada	15.5	15.6	15.3	–1.7	–1.0
USA	19.5	16.9	16.1	–4.7	–17.0
Latin America	**1.7**	**2.4**	**2.5**	**+4.1**	**+47.7**
of which: Brazil	1.3	2.1	2.2	+7.0	+72.4
Europe and former USSR	**9.4**	**7.2**	**7.2**	**–0.8**	**–23.6**
of which: EU-28	8.5	7.0	6.9	–1.5	–18.9
EU-15	8.4	7.1	7.0	–0.9	–16.4
of which: Germany	12.0	9.1	9.2	+1.6	–22.9
Spain	5.3	5.9	5.8	–1.5	+9.8
France	**6.1**	**5.0**	**5.1**	**+1.1**	–15.9
Italy	7.0	6.5	6.2	–4.9	–12.2
United Kingdom	9.6	7.0	7.2	+3.2	–25.2
13 new EU members	8.8	6.7	6.4	–4.0	–27.4
of which: Russia	14.7	11.6	11.6	–0.0	–21.3
Africa	**0.9**	**0.9**	**1.0**	**+3.0**	**+9.3**
Middle-East	**4.4**	**7.6**	**7.8**	**+2.4**	**+75.2**
Far East	**1.7**	**3.5**	**3.6**	**+2.7**	**+116.2**
of which: China	2.0	5.9	6.1	+2.6	+204.4
South Korea	5.3	11.9	11.9	+0.1	+121.7
India	0.7	1.5	1.6	+5.5	+136.5
Japan	8.5	9.3	9.6	+3.6	+12.2
Oceania	**13.8**	**15.4**	**15.2**	**–1.5**	**+10.2**
Annex I countries	**11.8**	**10.3**	**10.1**	**–1.9**	**–14.3**
Non-Annex I countries	**1.6**	**3.0**	**3.1**	**+2.4**	**+93.4**
World	**4.0**	**4.5**	**4.5**	**+0.1**	**+13.4**

Source: International Energy Agency (IEA), September 2014

Energy-related CO_2 Emissions in relation to GDP Worldwide



Source: International Energy Agency (IEA), September 2014

> The amount of CO_2 released by the creation of one unit of GDP has decreased in all geographic areas between 1990 and 2012 (–28% worldwide), except in the Middle East (+23%). In China, this ratio has been halved since 1990. Yet, it remains high, as in Russia: in these two countries, one unit of GDP, expressed in $ 2005 PPP[1], leads to more than 600 g of CO_2 emissions, while the global average is 383 g CO_2. In the EU-28, this indicator is rather low (248 g CO_2/$). With only 170 g CO_2/$, France is the second best performer of the EU-28, behind Sweden (122 g CO_2/$), where both nuclear and hydraulics are also very developed.

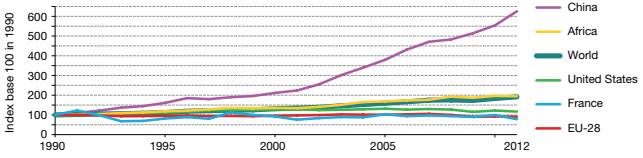
In g CO_2 / $ 2005 PPP[1]

	1990	2011	2012	Change (%) 2012/2011	Change (%) 2012/1990
North America	**564**	**376**	**354**	**–6.1**	**–37.3**
of which: Canada	554	423	413	–2.2	–25.3
USA	592	382	357	–6.6	–39.7
Latin America	**228**	**213**	**218**	**+2.3**	**–4.4**
of which: Brazil	144	163	174	+7.0	+20.5
Europe and former USSR	**588**	**337**	**334**	**–0.8**	**–43.1**
of which: EU-28	419	250	248	–0.9	–40.9
EU-15	359	229	229	+0.0	–36.2
of which: Germany	462	262	265	+1.1	–42.7
Spain	267	218	219	+0.2	–18.2
France	**249**	**168**	**170**	**+1.6**	**–31.7**
Italy	295	239	233	–2.3	–20.9
United Kingdom	428	212	221	+4.5	–48.3
13 new EU members	872	389	370	–4.9	–57.6
of which: Russia	1,164	785	762	–3.0	–34.6
Africa	**302**	**245**	**247**	**+0.8**	**–18.1**
Middle-East	**317**	**384**	**390**	**+1.5**	**+22.9**
Far East	**518**	**447**	**439**	**–1.8**	**–15.1**
of which: China	1,385	648	621	–4.2	–55.2
South Korea	490	430	424	–1.5	–13.6
India	414	344	351	+2.0	–15.1
Japan	323	301	306	+1.9	–5.0
Oceania	**573**	**434**	**423**	**–2.6**	**–26.2**
Annex I countries	**540**	**348**	**338**	**–2.9**	**–37.4**
Non-Annex I countries	**468**	**403**	**398**	**–1.3**	**–15.1**
World	**531**	**391**	**383**	**–2.1**	**–27.9**

1. Purchasing power parity.

Source: International Energy Agency (IEA), September 2014

CO_2 Emissions due to Electricity Production[1] Worldwide



Source: International Energy Agency (IEA), March 2014

> In 2011, global CO_2 emissions due to electricity generation (including CHP plants) reached 11.9 Gt CO_2. They have been rising steadily since 1990, by +3% per year on average. However, in the EU-28, these emissions shrank by –9% over the same period, amounting to 1.1 Gt CO_2 in 2011. Germany, where coal accounts for 46% of the electricity mix, is responsible for a quarter of all the CO_2 released by EU-28 power stations. France accounts only for 2% of the European CO_2 emissions, although its production of electricity represents 17% of the European total.

In Mt CO_2

	1990	2010	2011	Share in energy-related emissions in 2011 (%) [2]	Change (%) 2011/2010	Change (%) 2011/1990
North America	**2,022**	**2,506**	**2,416**	**38.6**	**–3.6**	**+19.5**
of which: Canada	95	108	106	19.8	–1.6	+12.2
USA	1,864	2,274	2,177	41.2	–4.3	+16.8
Latin America	**98**	**234**	**233**	**20.0**	**–0.7**	**+136.6**
of which: Brazil	12	45	36	8.8	–19.0	+193.8
Europe and former USSR	**2,139**	**1,919**	**1,979**	**30.6**	**+3.1**	**–7.5**
of which: EU-28	1,257	1,154	1,148	32.4	–0.5	–8.6
EU-15	947	884	862	30.4	–2.5	–9.0
of which: Germany	332	287	287	38.7	+0.0	–13.6
Spain	65	71	84	31.1	+18.8	+30.3
France	**44**	**44**	**34**	**10.4**	**–21.7**	**–22.2**
Italy	122	121	121	30.7	–0.5	–1.4
United Kingdom	214	173	161	36.8	–7.1	–24.7
13 new EU members	310	269	286	40.4	+6.2	–7.6
of which: Russia	440	427	461	27.9	+7.9	+4.7
Africa	**212**	**416**	**412**	**42.1**	**–1.0**	**+94.7**
Middle-East	**179**	**590**	**613**	**37.3**	**+3.9**	**+243.0**
Far East	**1,412**	**5,462**	**5,991**	**45.1**	**+9.7**	**+324.5**
of which: China	581	3,219	3,635	45.4	+12.9	+525.7
South Korea	55	265	284	48.1	+6.9	+417.4
India	235	877	901	49.2	+2.7	+283.4
Japan	363	463	519	43.8	+11.9	+42.7
Oceania	**130**	**220**	**214**	**51.1**	**–2.5**	**+65.2**
Annex I countries	**4,410**	**4,839**	**4,837**	**36.3**	**–0.1**	**+9.7**
Non-Annex I countries	**1,799**	**6,514**	**7,027**	**41.6**	**+7.9**	**+290.7**
World	**6,191**	**11,349**	**11,861**	**37.8**	**+4.5**	**+91.6**

Source: International Energy Agency (IEA), March 2014

1. Includes emissions related to electricity generation (including CHP plants) as a main activity, and emissions in autoproducer plants. The latter produce electricity as a complement of another activity, industrial for instance. It should be highlighted that IPCC guidelines recommend to record emissions of autoproducers in the final sector which produced them and not in the electricity generation sector. This is a reason why these figures are different from those of page 24.
2. Ratio between emissions due to electricity generation (including CHP plants) and energy-related emissions (page 15).

2012 GHG Emissions in the EU-28

In Mt CO_2e

Sector	Year	CO_2	CH_4	N_2O	Fluorinated gases	Total
Energy Use	1990	4,136.1	155.1	33.4	0.0	4,324.6
	2012	3,495.2	76.2	32.3	0.0	3,603.8
Industrial Processes	1990	284.2	1.3	116.1	60.3	462.0
	2012	212.2	1.1	12.1	95.2	320.6
Solvent and Other Product Use	1990	11.8	0.0	5.1	0.0	16.9
	2012	6.8	0.0	3.1	0.0	9.9
Agriculture	1990	0.0	257.6	359.6	0.0	617.2
	2012	0.0	197.4	271.7	0.0	469.1
Waste[1]	1990	4.9	187.1	13.5	0.0	205.6
	2012	2.9	123.5	14.4	0.0	140.8
Total emissions excluding LULUCF[2]	**1990**	**4,437.0**	**601.2**	**527.8**	**60.3**	**5,626.3**
	2012	**3,717.1**	**398.2**	**333.6**	**95.2**	**4,544.2**
LULUCF[2]	1990	–269.4	5.5	5.6	0.0	–258.3
	2012	–315.7	5.2	7.0	0.0	–303.6
Total	**1990**	**4,167.6**	**606.7**	**533.4**	**60.3**	**5,367.9**
	2012	**3,401.5**	**403.4**	**340.6**	**95.2**	**4,240.7**

Source: European Environment Agency (EEA), June 2014

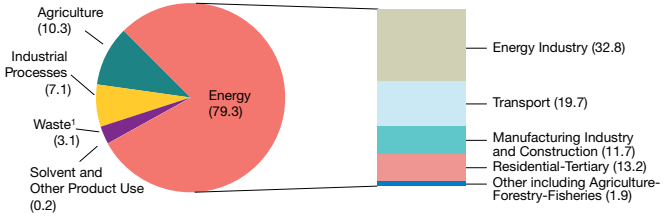
> GHG emissions excluding land use, land use change and forestry (LULUCF) in the EU-28 have decreased by 19% over the 1990-2012 period.

> At the EU-28 level, energy use is the main source of GHG (79%). The main emitter is the energy industry (33%), followed by transportation (20%).

> Emissions in the EU-28 decreased by 1.3% between 2011 and 2012. It is mainly due to the economic slowdown, particularly in the road transportation sector and in the manufacturing industry.

Distribution by sources of GHG emissions in the EU in 2012 (4,544 Mt CO_2e excluding LULUCF[2])

In %



Source: European Environment Agency (EEA), June 2014

1. Excluding the incineration of waste with recuperation of heat (included in "Energy Industry"). See page 32.
2. Land Use, Land Use Change and Forestry.

2012 GHG Emissions in France

In Mt CO_2e

Sector	Year	CO_2	CH_4	N_2O	Fluorinated gases	Total
Energy Use	1990	368.3	10.4	3.8	0.0	382.5
	2012	344.3	2.8	4.3	0.0	351.4
Industrial Processes	1990	24.2	0.1	24.6	10.2	59.1
	2012	16.7	0.0	0.9	18.0	35.7
Solvent and Other Product Use	1990	2.0	0.0	0.1	0.0	2.1
	2012	1.0	0.0	0.1	0.0	1.1
Agriculture	1990	0.0	39.4	61.3	0.0	100.7
	2012	0.0	38.4	50.8	0.0	89.3
Waste[1]	1990	1.8	9.5	1.6	0.0	12.9
	2012	1.2	10.1	1.3	0.0	12.6
Total emissions excluding LULUCF[2]	**1990**	**396.3**	**59.4**	**91.4**	**10.2**	**557.4**
	2012	**363.3**	**51.4**	**57.5**	**18.0**	**490.1**
LULUCF[2]	1990	–31.1	1.2	1.4	0.0	–28.6
	2012	–47.8	1.1	2.4	0.0	–44.3
Total	**1990**	**365.2**	**60.6**	**92.7**	**10.2**	**528.7**
	2012	**315.5**	**52.5**	**59.9**	**18.0**	**445.9**

Source: European Environment Agency (EEA), June 2014

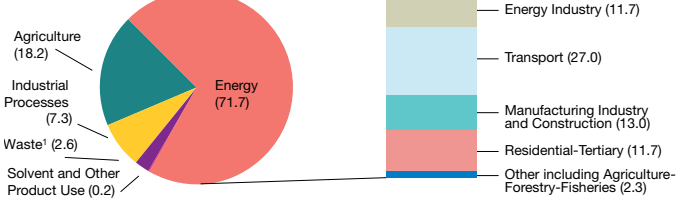
> GHG emissions excluding land use, land use change and forestry (LULUCF) in France have decreased by 12% over the 1990-2012 period.

> As is the case in the EU-28, energy use is the main source of GHG in France (71%). On the other hand, in France, transportation is the most emitting sector (27%), while the energy industry is a rather low emitter (12%), because of the primary nuclear production.

> French emissions remained stable between 2011 and 2012.

Distribution by sources of GHG emissions in France in 2012 (490 Mt CO_2e excluding LULUCF[2])

In %

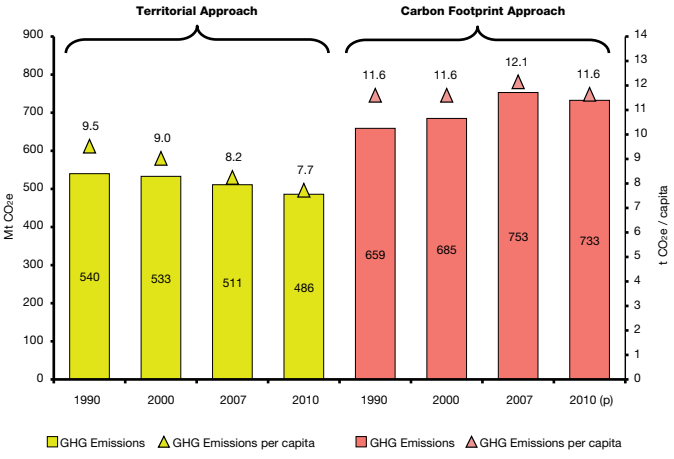


Source: European Environment Agency (EEA), June 2014

1. Excluding the incineration of waste with recuperation of heat (included in "Energy Industry"). See page 32.
2. Land Use, Land Use Change and Forestry.

3.3

GHG Emissions in France according to the Territorial Approach and the Carbon Footprint Approach



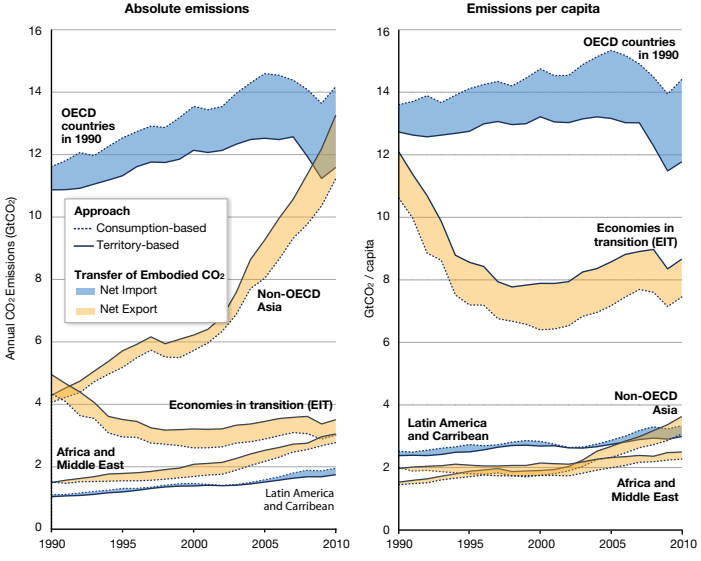
Source: SOeS calculations, based on IEA, Citepa, French Customs, Eurostat and Insee data
(p): provisional data

> In the Territorial Approach, chosen by the Kyoto Protocol, GHG emissions are accounted for where they are emitted. In the Footprint Approach, emissions related to the final domestic demand are assessed, by adding emissions induced by imported products and by deducting those incurred by products manufactured on the domestic territory and exported.

> In 2010, according to the Territorial Approach, France emitted 486 million tons of CO_2 equivalent (Mt CO_2e) of GHG (CO_2, CH_4 et N_2O), i.e. 7.7 tons per capita. These emissions dropped by 19% compared to their 1990 level. However, with the Foootprint Approach, they amount to 733 Mt CO_2e in 2010, which means the same amount as in 1990 if calculated per capita, i.e. 11.6 tons per capita.

> In 2010, territorial emissions represented only 66% of the Footprint Approach emissions, compared to 82% in 1990. This evolution is due to the expansion of the French service sector, and in contrast, to the decline of industry and agriculture, which are big emitters of respectively CO_2 and methane (CH_4). As such, a growing part of emissions related to the French domestic demand is imported with manufactured goods.

International Comparison of CO_2 Emissions according to the Territorial Approach and the Carbon Footprint Approach



Source: IPCC, 3rd working group, 2014

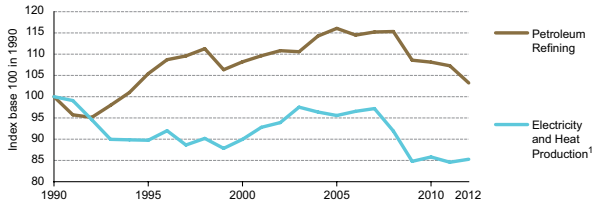
> Between 1990 and 2010, the CO_2 emissions of OECD countries have grown by 6% according to the Territorial Approach, but by more than 20% according to the Footprint Approach. In non-OECD Asian countries, CO_2 emissions calculated under the Territorial Approach have tripled over thirty years, exceeding in 2008 the emissions level of OECD countries. However, under the Footprint Approach, this result is reversed: in 2010, CO_2 emissions of non-OECD Asian countries were still 20% lower than those of OECD countries.

> The gap between groups of developed countries and developing ones remains even clearer when viewed in terms of per capita emissions. In countries with economies in transition - EIT, mainly countries of Central and Eastern Europe - per capita emissions are lower than in OECD countries, by 25% according to the Territorial Approach, and by nearly 50% according to the Footprint Approach. In non-OECD Asian countries, they are at least three times lower than in OECD countries, whatever the approach.

GHG Emissions from Energy Industry in the EU

In Mt CO_2e

	1990	2000	2005	2011	2012	2012/1990 (%)
Electricity and Heat Production[1]	1,437	1,293	1,373	1,215	1,225	–15
Petroleum Refining	123	133	143	132	127	+3
Solid Mineral Fuels[2] Conversion and Others	116	82	78	66	56	–51
Fugitive Emissions from Fuels[3]	156	112	96	81	81	–48
Total	**1,832**	**1,620**	**1,690**	**1,494**	**1,489**	**–19**

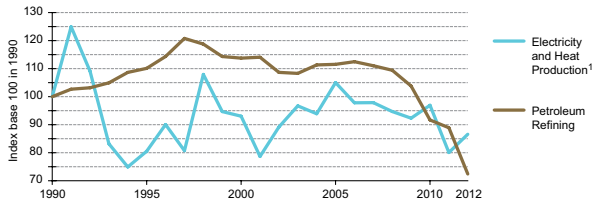


Source: European Environment Agency (EEA), June 2014

GHG Emissions from Energy Industry in France
(including Overseas Departments)

In Mt CO_2e

	1990	2000	2005	2011	2012	2012/1990 (%)
Electricity and Heat Production[1]	47.3	44.0	49.7	37.9	41.0	–13
Petroleum Refining	12.0	13.7	13.4	10.7	8.7	–28
Solid Mineral Fuels[2] Conversion and Others	4.8	4.3	3.8	3.2	3.0	–38
Fugitive Emissions from Fuels[3]	10.0	7.9	5.4	5.2	4.6	–54
Total	**74.2**	**70.0**	**72.4**	**57.0**	**57.3**	**–23**



Source: Citepa, June 2014

1. Includes the incineration of waste with recuperation of heat.
2. Coal and coal products. Emissions mainly linked to the activity of coking plants.
3. Mainly linked to the activities of extraction of fossil fuels (oil, gas and coal).

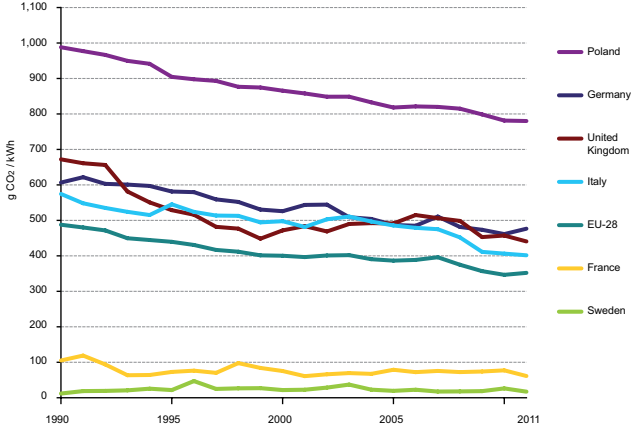
CO_2 Emissions per kWh of Electricity in the EU

In g CO_2/kWh

	1990	2000	2010	2011	Change (%) 2011/2010	Change (%) 2011/1990
EU-28	**488**	**400**	**347**	**352**	**+1.6**	**–27.8**
EU-15	**442**	**363**	**310**	**310**	**+0.1**	**–29.8**
of which: Germany	607	526	461	477	+3.3	–21.4
Austria	238	170	193	215	+11.1	–9.7
Belgium	347	291	220	196	–10.9	–43.6
Spain	427	432	237	291	+22.6	–31.9
Finland	188	173	230	191	–16.9	+1.2
France	**105**	**75**	**77**	**61**	**–20.7**	**–41.7**
Italy	575	498	406	402	–1.2	–30.1
Netherlands	607	477	415	404	–2.6	–33.5
United Kingdom	672	472	457	441	–3.6	–34.4
Sweden	12	22	26	17	–34.8	+44.4
13 new EU members	**714**	**623**	**566**	**592**	**+4.6**	**–17.1**
of which: Poland	988	866	781	780	–0.2	–21.0
Czech Republic	744	728	589	591	+0.3	–20.6

Source: International Energy Agency (IEA), March 2014

> Calculated per kWh, emissions of CO_2 vary widely among EU-28 countries. They are very high (more than 400 g CO_2/kWh) in countries where coal is an important source of energy, for instance in Germany and in some countries of Central and Eastern Europe. They are lower in countries where renewables and/or nuclear are developed, such as France (nuclear 76%, hydro 10%) and Sweden (hydro 47%, nuclear 38%).

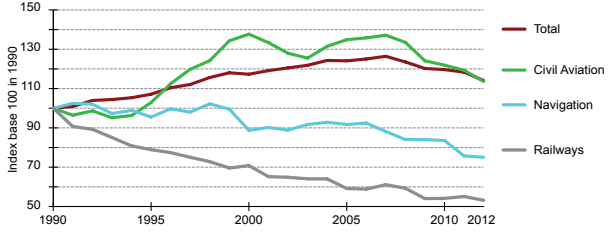


Source: International Energy Agency (IEA), March 2014

GHG Emissions from Transportation[1] in the EU

In Mt CO_2e

	1990	2000	2005	2011	2012	2012/1990 (%)
Civil Aviation	14	20	19	17	16	+14
Road Transportation	722	860	913	875	843	+17
Railways	13	10	8	7	7	–47
Navigation	23	20	21	17	17	–25
Other	10	9	10	9	9	–2
Total	**783**	**918**	**971**	**926**	**893**	**+14**



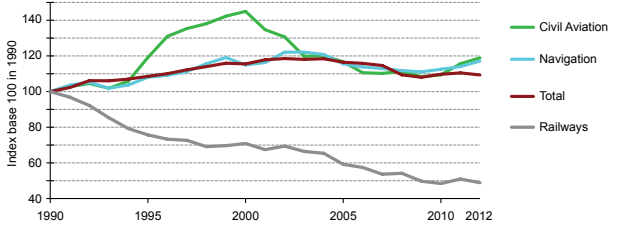
NB: road transportation is not represented on this figure for visibility reasons, since it almost duplicates the total line.

Source: European Environment Agency (EEA), June 2014

GHG Emissions from Transportation[2] in France (including Overseas Departments)

In Mt CO_2e

	1990	2000	2005	2011	2012	2012/1990 (%)
Civil Aviation	4.3	6.2	5.0	5.0	5.1	+19
Road Transportation	114.6	131.3	133.4	126.7	125.1	+9
Railways	1.1	0.8	0.6	0.5	0.5	–51
Navigation	1.1	1.2	1.3	1.2	1.3	+17
Other	0.2	0.5	0.9	0.5	0.5	+150
Total	**121.2**	**140.0**	**141.2**	**133.9**	**132.5**	**+9**



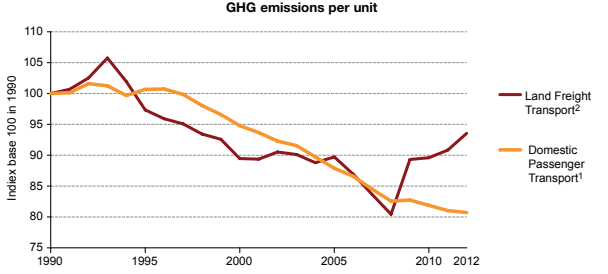
1. Excludes international transport.
2. Includes transport between Metropolitan France and Overseas Departments, but excludes international transport.

Source: Citepa, June 2014

GHG Emissions per Passenger-km and Metric ton-km in Metropolitan France

In index base 100 in 1990

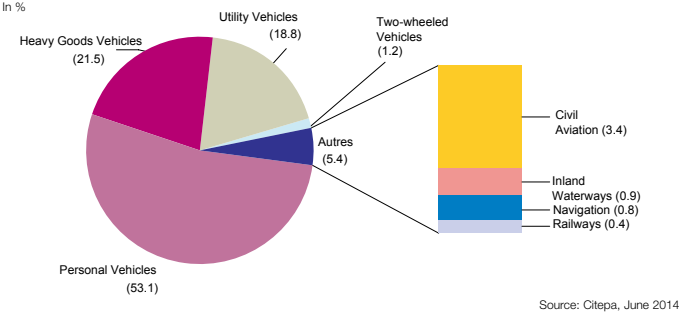
	1990	2000	2005	2011	2012
Domestic Passenger Transport[1]	100	94.8	87.9	81.0	80.7
Land Freight Transport[2]	100	89.5	89.7	90.8	93.5



Source: Citepa, June 2014 and SOeS

1. GHG emissions per carried km-passenger.
2. GHG emissions per metric ton-km of freight.

GHG Emissions by Transportation Mean[3] in Metropolitan France (132.2 Mt CO_2e in 2012)



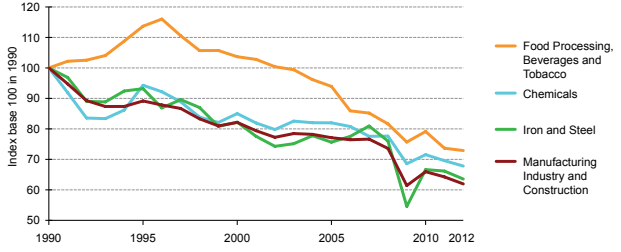
Source: Citepa, June 2014

3. Includes transport inside Metropolitan France only.

GHG Emissions from Manufacturing Industry and Construction in the EU

In Mt CO_2e

	1990	2000	2005	2011	2012	2012/1990 (%)
Total	**861**	**707**	**663**	**553**	**533**	**–38**
of which: Iron and Steel	185	152	140	123	118	–36
Chemicals	133	113	109	92	90	–32
Food Processing, Beverages and Tobacco	54	56	51	40	39	–27

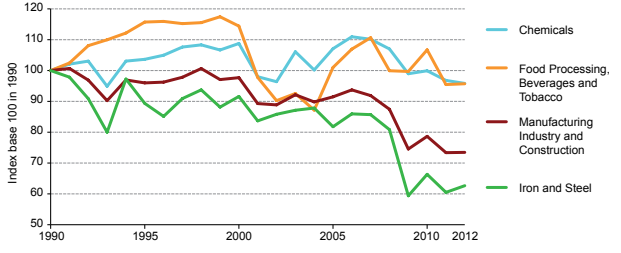


Source: European Environment Agency (EEA), June 2014

GHG Emissions from Manufacturing Industry and Construction in France (including Overseas Departments)

In Mt CO_2e

	1990	2000	2005	2011	2012	2012/1990 (%)
Total	**86.5**	**84.5**	**79.1**	**63.4**	**63.5**	**–27**
of which: Iron and Steel	21.5	19.7	17.6	13.0	13.4	–37
Chemicals	19.8	21.6	21.2	19.2	19.0	–4
Food Processing, Beverages and Tobacco	9.3	10.6	9.4	8.9	8.9	–4



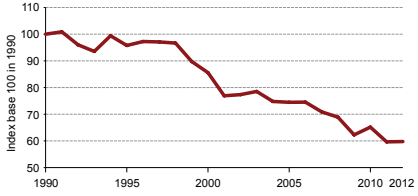
Source: Citepa, June 2014

Intensity of GHG Emissions from Manufacturing Industry and Construction in France

In index base 100 in 1990

	1990	2000	2005	2011	2012
GHG Emissions / Value Added	100	85.6	74.5	59.6	59.8

GHG Emissions per Unit of Value Added

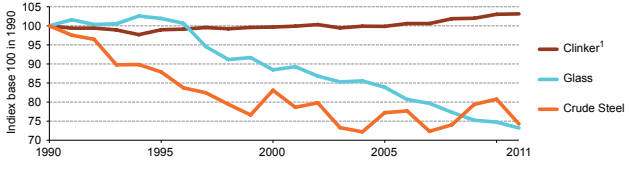


Source: Insee (value added), Citepa (GHG emissions), June 2014

GHG Emissions from a Selection of Energy-Intensive Products in France

		1990	2000	2005	2010	2011	2011/1990 (%)
Crude Steel	Production (Mt)	19.0	21.0	19.5	15.4	15.8	–17
	t CO_2/t steel	1.78	1.48	1.37	1.44	1.32	–26
Glass	Production (Mt)	4.8	5.5	5.6	4.6	5.0	+4
	t CO_2/t glass	0.70	0.62	0.59	0.52	0.51	–27
Clinker[1]	Production (Mt)	20.9	16.3	17.3	14.9	15.2	–27
	t CO_2/t clinker	0.87	0.86	0.86	0.89	0.89	+3

Specific CO_2 Emissions



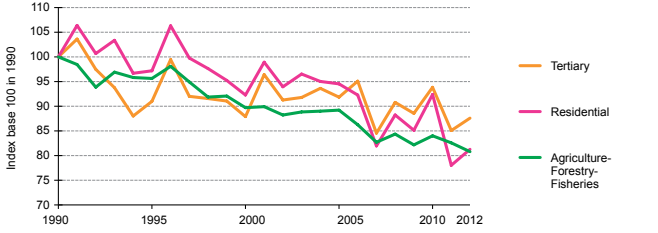
1. Constituent of cement that stems from the cooking of a mix of silica, oxid of iron and lime.

Source: Fédération Française de l'Acier (FFA), Fédération des Chambres Syndicales de l'Industrie du Verre (FCSIV), Syndicat Français de l'Industrie Cimentière (SFIC)

GHG Emissions from Other Sectors[1] in the EU

In Mt CO_2e

	1990	2000	2005	2011	2012	2012/1990 (%)
Total	**849**	**759**	**778**	**669**	**688**	**–19**
of which : Residential	523	483	495	408	425	–19
Tertiary	201	177	185	171	176	–12
Agriculture-Forestry-Fisheries	97	87	86	80	78	–19

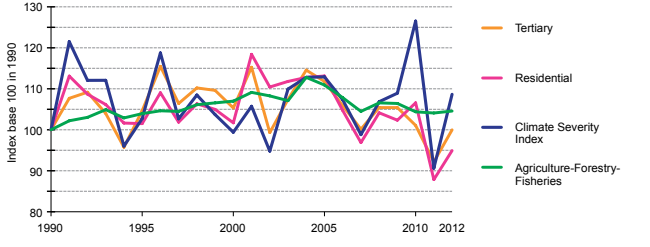


Source: European Environment Agency (EEA), June 2014

GHG Emissions from Other Sectors[1] in France (including Overseas Departments)

In Mt CO_2e

	1990	2000	2005	2011	2012	2012/1990 (%)
Total	**100.6**	**104.0**	**113.2**	**91.4**	**98.0**	**–3**
of which : Residential	60.6	61.6	68.6	53.3	57.5	–5
Tertiary	29.1	30.6	32.5	26.8	29.1	–0
Agriculture-Forestry-Fisheries	10.9	11.7	12.1	11.4	11.4	+5



Source: Citepa, June 2014, and SOeS, according to Météo France

> Emissions from the residential-tertiary sector depend on climatic conditions. Temperatures were particularly mild in 1994, 2002, 2007 and 2011. Therefore, heating energy consumption and thus GHG emissions were rather low. Conversely, the climate was exceptionaly cold in 1991, 1996 and 2010, leading to higher emissions.

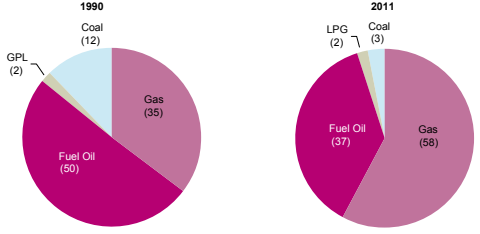
1. Direct emissions from sectors other than energy industry, transportation and manufacturing industry and construction.

Contribution of each Energy to CO_2 Emissions from Heating[1] in Residential Buildings in Metropolitan France

In %

	1990	1995	2000	2005	2010	2011
Natural Gas	35	42	45	52	59	58
Fuel Oil	50	46	45	42	37	37
Liquefied Petroleum Gas (LPG)	2	3	3	3	2	2
Coal	12	9	6	3	3	3

En %



Source: SOeS calculations, according to Ceren

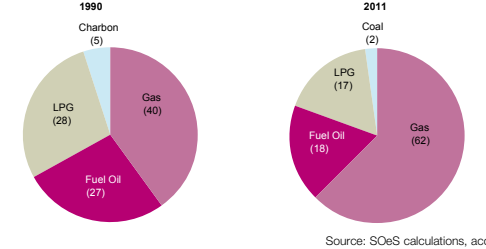
> Over the period, among fossil fuels, coal and fuel oil have been substituted for natural gas in the residential-tertiary sector. This explains the increase of the contribution of natural gas to CO_2 emissions.

Contribution of each Energy to CO_2 Emissions from Water Heating[1] and Cooking[1] in Residential Buildings in Metropolitan France

In %

	1990	1995	2000	2005	2010	2011
Natural Gas	40	42	45	54	61	62
Fuel Oil	27	28	28	23	19	18
Liquefied Petroleum Gas (LPG)	28	26	24	21	18	17
Coal	5	4	3	2	2	2

En %



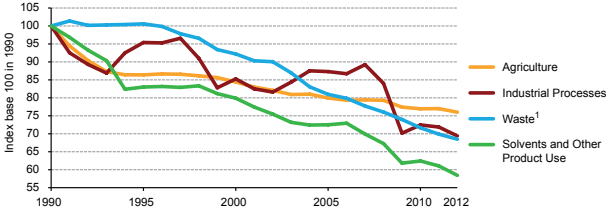
Source: SOeS calculations, according to Ceren

1. Only direct CO_2 emissions from fossil fuels combustion are taken into account. Emissions due to electricity consumption are not measured.

GHG Emissions excluding Fossil Fuel Combustion in the EU

In Mt CO_2e

	1990	2000	2005	2011	2012	2012/1990 (%)
Total	**1,302**	**1,118**	**1,076**	**961**	**940**	**–28**
Agriculture	617	521	493	475	469	–24
Industrial Processes	462	394	403	332	321	–31
Waste[1]	206	190	166	144	141	–32
Solvent and Other Product Use	17	14	12	10	10	–42

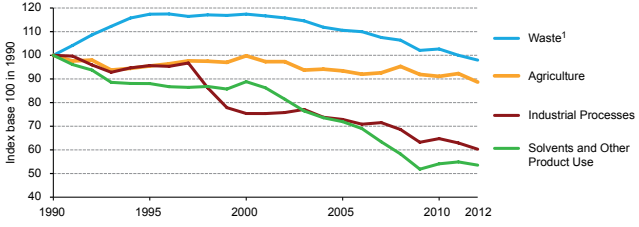


Source: European Environment Agency (EEA), June 2014

GHG Emissions excluding Fossil Fuel Combustion in France (including Overseas Departments)

In Mt CO_2e

	1990	2000	2005	2011	2012	2012/1990 (%)
Total	**174.8**	**162.1**	**152.9**	**144.2**	**138.7**	**–21**
Agriculture	100.7	100.5	94.0	92.9	89.3	–11
Industrial Processes	59.1	44.6	43.1	37.2	35.7	–40
Waste[1]	12.9	15.1	14.3	12.9	12.6	–2
Solvent and Other Product Use	2.1	1.9	1.5	1.2	1.1	–46



Source: Citepa, June 2014

1. Excludes the incineration of waste with recuperation of heat (included in "Energy Industry").

CO_2 Emission Factors for Main Fossil Fuels

In t CO_2/toe

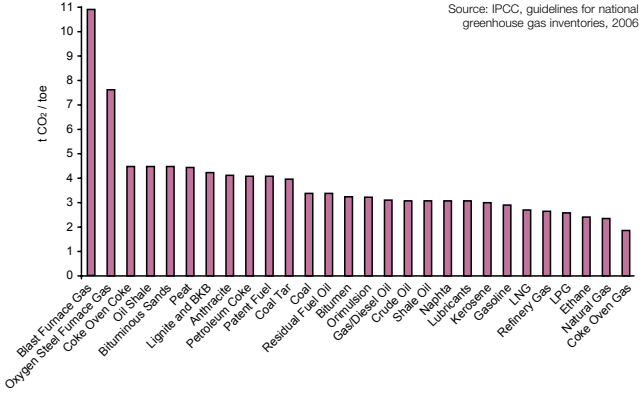
Blast Furnace Gas	10.9	Gas/Diesel Oil	3.1
Coke Oven Coke	4.5	Shale Oil	3.1
Bituminous Sands	4.5	Crude Oil	3.1
Peat	4.4	Kerosene	3.0
Lignite and BKB	4.2	Gasoline	2.9
Patent Fuel	4.1	LNG	2.7
Anthracite	4.1	LPG	2.6
Petroleum Coke	4.1	Refinery Gas	2.4
Coal	4.0	Natural Gas	2.3
Bitumen	3.4	Coke Oven Gas	1.9

Source: IPCC, guidelines for national greenhouse gas inventories, 2006

> CO_2 emission factors indicate the amount of CO_2 emitted during the combustion of given fuel for the production of a single energy unit (in this case, the ton oil equivalent - toe). The factor represents the ratio between the observed CO_2 emissions and the amount of energy burnt.

> These factors are global averages and can differ from one country to another.

> Biomass fuels are not treated here: CO_2 emissions related to the combustion of biomass fuels are supposedly compensated by the absorption of CO_2 during the reconstitution of given fuel. If the reconstitution of the biomass fuel does not occur, the non-compensated emissions are recorded in LULUCF calculations (Land Use, Land Use Change and Forestry).



Source: IPCC, guidelines for national greenhouse gas inventories, 2006

United Nations Framework Convention on Climate Change (UNFCCC)

> The UNFCCC, adopted in 1992 in Rio de Janeiro, aims at preventing dangerous human effects on the climate. The Treaty recognizes 3 principles:

- **the precautionary principle:** lack of scientific certainty over climate change impacts shall not be used as a reason for postponing action;
- **the principle of common, but differentiated, responsibility:** any GHG emission has an impact on global warming but the most industrialized countries carry a greater responsibility for current GHG concentration;
- **the principle of the right to development:** climate actions shall not have any negative impact on basic needs of developing countries, including, among others, a sustainable economic growth and fight against poverty.

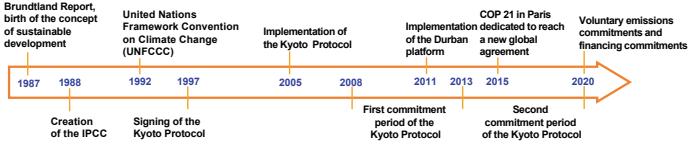
> Member countries of the UNFCCC meet at the end of each year for the "Conference of the Parties" (COP). During these conferences, major decisions are taken on the UNFCCC. The 20th COP takes place in Lima (Peru) from the 1st to the 12th December 2014.

Latest Developments in International Negotiations

> The Cancun (2010), Durban (2011) and Doha (2012) agreements established that:

- the increase of the average temperature should be contained at a maximum of **+2°C** by the end of the century, as the IPCC strongly recommended;
- developed countries will provide funds for mitigation and adaptation in developing countries. Financing should reach **100 billion US dollars per year** by 2020;
- **a second Commitment Period** under the Kyoto Protocol will be established between 2013 and 2020;
- the **Durban platform** leading to a post-2020 international agreement must be enforced by 2015;
- countries that do not have commitments under the Kyoto Protocol will commit to voluntary emissions reduction for 2020.

> The 21st COP, in 2015, will take place at Paris-Le Bourget, in France.



Source: CDC Climat Research

> **Agreed in 1997, the Protocol was implemented in 2005.** The requisite quorum of at least 55 countries representing a minimum of 55% of Annex B emissions in 1990 was thus achieved in November of 2004 after the ratification of the Protocol by Russia.

> When the Kyoto Protocol was signed, the emissions of the 40 most industrialized countries (listed in Annex B of the Protocol) are to be reduced by at least **5% between 2008 and 2012** compared to 1990 levels. The target is differentiated by country. Non-Annex B countries have no set objectives.

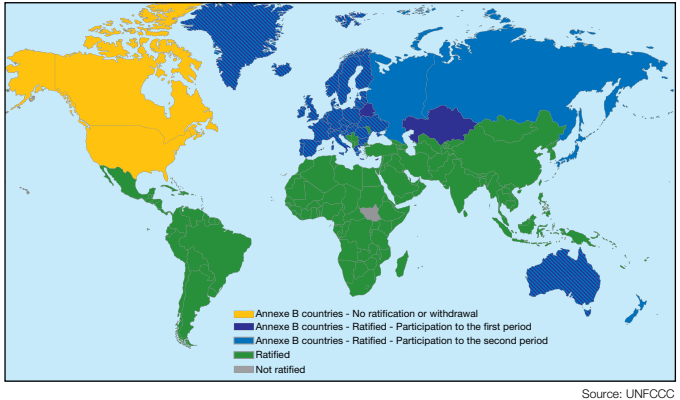
> **Six GHGs induced by human activity** are included: CO_2, CH_4, N_2O, HFCs, PFCs, SF_6. As from 2013, NF_3 is also included.

> The United States has not ratified the Protocol and therefore is not subject to the fixed reduction objectives for 2008-2012. In December 2011, Canada withdrew from the Kyoto Protocol. This withdrawal was effective from December 2012. Canada was thus not be obligated to respect its target under the first Commitment Period of the Kyoto Protocol.

> To comply, Annex B countries must submit as many allowances (Assigned Amounts Units – AAUs) and carbon credits as their cumulated verified emissions over one period (between 2008 and 2012 for the first period).

> In Durban, in 2011, member parties agreed on the extension of the Protocol beyond 2012. There will thus be **a second Commitment Period of the Kyoto Protocol**. (see p. 37).

State of Kyoto Protocol ratification as of 30 September 2014



Source: UNFCCC

First Commitment Period of the Kyoto Protocol (2008-2012)

> The initial global target of reducing GHG emissions reduction by 5% under the Kyoto Protocol was shared between the Annex B countries according to their economic development and potential to reduce emissions.

> Eastern European countries received more AAUs than their actual emissions to help them "catch up" with the level of development of other Annex B countries. This surplus is often referred to as "hot air".

> Globally, even without taking into account the "hot air" effect, developed countries have largely overachieved their target. However, the level of overachievement (20 percentage points) is mainly explained by the hot air.

Country	Kyoto objectives for 2008-2012 (in %)[1]	Yearly average of AAUs received over 2008-2012 (in millions)	Yearly average emissions over 2008-2012 (including credits and debits under LULUCF)		Distance to Kyoto objective (in % points)
			in Mt CO_2e	Evolution (in %)[1]	
EU-15	–8	3,924	3,702	–13	5
Bulgaria	–8	122	62	–54	46
Czech Republic	–8	179	135	–31	23
Croatia	–5	30	28	–11	6
Estonia	–8	39	20	–54	46
Hungary	–6	108	65	–44	38
Latvia	–8	24	10	–61	53
Lithuania	–8	45	21	–58	50
Poland	–6	530	396	–30	24
Romania	–8	256	120	–57	49
Slovakia	–8	66	45	–38	30
Slovenia	–8	19	18	–10	2
Australia	8	592	565	3	5
Iceland	10	4	4	10	0
Japan	–6	1,186	1,230	–3	–3
Liechtenstein	–8	0	<1	3	–11
Monaco	–8	0	<1	–12	4
Norway	1	50	54	8	–7
New Zealand	0	62	60	–3	3
Russia	0	3,323	2,114	–36	36
Switzerland	–8	49	51	–4	–4
Ukraine	0	921	394	–57	57
Total	**–4**	**11,528**	**9,092**	**–24**	**20**
Uniteds States[2]	–7	n.a.	6759	10	–17
Canada[3]	–6	n.a.	704	19	–25
Belarus[4]	–8	n.a.	89	–36	28
Kazakhstan[4]	0	n.a.	271	–25	25

EU Countries, Non-EU Annex B countries, Annexe B countries for which the Kyoto Protocol is not applyed for the first period.

1. Compared to the reference year, generally 1990. 2. USA Did not ratified the Protocol. 3. Canada withdrawn from the Kyoto Protocol in 2011. 4. Amendments integrating Belarus and Kazakhstan into the Annex B are not ratified yet and are therefore not applied yet. 2008-2012 emissions data must be validated by 2015. The figures are therefore not final.

Source: CDC Climat Research based on UNFCCC, 2014

> Since from 2008 on, Annex B countries can exchange AAUs, on the condition that they possess at any given moment at least 90% of all AAUs allocated, or five times their last GHG emissions inventory.

> Late 2013, all Annex B countries had enough allowances and carbon credits to comply with their commitment.

Second Commitment Period of the Kyoto Protocol (2013-2020)

> The rules of the second period of the Kyoto Protocol (2013-2020) were finalized in Doha in 2012. Japan, Russia and New Zealand have announced they would not participate in the second Commitment Period of the Kyoto Protocol (CP2). Countries that have announced a commitment to the CP2 represent 13% of global emissions in 2010.

> Part of the rules decided in Doha have the aim of aim at reducing the impact of hot air during the second period. One of these rules constrains countries to adopt emissions targets that do not imply an increase of emissions compared to the 2008-2010 levels. This rule jeopardizes the final participation of Belarus, Kazakhstan and Ukraine to the CP2; even if, for the latter, the surplus of allowances accumulated during the first period would offset the impact of these new rules.

> A new system simplifies the formalities for countries wishing to increase their ambition during the period.

> To be implemented, these provisions must be ratified by at least 75% of the countries that have ratified the Kyoto Protocol.

In %

Country	Commitment CP1 (2008-2012) compared to base-year[1]	Commitment CP2 pledged by countries (2013-2020) compared to base-year[1]	Commitment KP-CP2 pledged by countries (2013-2020) compared to 2008-2010 emissions	Commitment CP2 compared to base-year[1] after applying Doha amendments	Commitment CP2 compared to 2008-2012 emissions after applying Doha amendments and carrying-over surplus[2]
Australia	+8%	–0.5%	–5%	–0.5%	–3%
Belarus[3]	n.a.	–12%	+37%	–36%	+1%
Croatia[4]	–5%	–20%	–12%	–20%	–8%
EU-27[5]	–7.9%	–20%	–2%	–20%	0%
Iceland[4]	+10%	–20%	–33%	–20%	–32%
Kazakhstan[3]	n.a.	–5%	+34%	–29%	–2%
Liechtenstein	–8%	–16%	–22%	–16%	–20%
Monaco	–6%	–22%	–8%	–22%	–1%
Norway	+1%	–16%	–19%	–16%	–20%
Switzerland	–8%	–15.8%	–16%	–15.8%	–13%
Ukraine	0%	–24%	+81%	–58%	+85%[6]
TOTAL	**–6%**	**–18%**	**+5%**	**–24%**	**+5%**
TOTAL excl. EIT[3] not in EU	**–6%**	**–18%**	**–2%**	**–18%**	**–1%**

Source: CDC Climat Research based on UNFCCC, 2014

1. Generally 1990.
2. The surplus is calculated with 2008-2012 emissions and does not take into account trading of allowances and carbon credits.
3. Economies in Transition. Here, only non-EU countries are included. The participation of Belarus, Kazakhstan and Ukraine is still uncertain.
4. For CP2, Croatia and Iceland will fulfill their commitments jointly with the EU in accordance with Article 4 of the Kyoto Protocol.
5. The EU-27 countries have differentiated commitments under the CP1. The provided data therefore aggregates those of the concerned countries. According to the European Climate and Energy Package, countries are not allowed to use their surplus of AAUs for 2013-2020.
6. This percentage is valid only if Ukraine reviews its CP2 commitment to make it match with its 2008-2010 emissions level.

Objectives of European Member States for the First Period of the Kyoto Protocol (2008-2012)

> The European Union (EU) was allowed to **share its total objective of –8% among its 15 member countries.** Since then, the EU has added 12 new members, who, except for Cyprus and Malta, also have Kyoto Protocol commitments.

Country	Kyoto commitment for 2008-2012 (in %)[1]	Yearly average of AAUs received over 2008-2012 (in millions)	Yearly average emissions over 2008-2012 (including credits and debits under the LULUCF)		Distance to Kyoto objective (in % points)
			In Mt CO_2e	Évolution (in %)[1]	
Austria	–13.0	69	82	3.2	–16.2
Belgium	–7.5	135	125	–13.9	6.4
Denmark	–21.0	55	58	–17.3	–3.7
Finland	0.0	71	67	–5.5	5.5
France	0.0	564	505	–10.5	10.5
Germany	–21.0	974	933	–24.3	3.3
Greece	25.0	134	119	11.5	13.5
Ireland	13.0	63	58	5.1	7.9
Italy	–6.5	483	480	–7.1	0.6
Luxembourg	–28.0	9	12	–9.3	–18.7
Netherlands	–6.0	200	200	–6.2	0.2
Portugal	27.0	76	62	3.5	23.5
Spain	15.0	333	348	20.0	–5.0
Sweden	4.0	75	59	–18.3	22.3
United Kingdom	–12.5	682	597	–23.4	10.9

1. Compared to the reference year, generally 1990.

Source: CDC Climat Research based on European Commission and UNFCCC, 2014

Burden Sharing and Bubbling

> Under the Kyoto Protocol, the European Union makes a commitment on behalf of all the countries composing it at the time of adoption of the text (15 countries for the first commitment period, 27 countries for the second period). The EU then has to distribute this commitment among its member countries. For the first period, this was done in the so-called "burden sharing" directive adopted in 2002.

> This flexibility offered to the EU is called "bubbling". Within the EU, a surplus of allowances and credits for one country can offset a deficit for another. In this case, the EU as a whole will be deemed compliant.

The Energy/Climate Package (2030)

> The European Council in March 2007 announced its so-called "3x20" climate targets for 2020. These aimed to:

- reach a 20% **share of renewable energy** in energy consumption,
- improve **energy efficiency** by 20%,
- reduce **GHG emissions** by 20% compared to 1990. If a satisfactory international agreement is signed, this objective would increase to **–30%**.

> The **Energy/Climate legislative package of March 2009** establishes specific policies to reach these goals and distributes them to the members states (which may adopt more restrictive regulations if they wish).

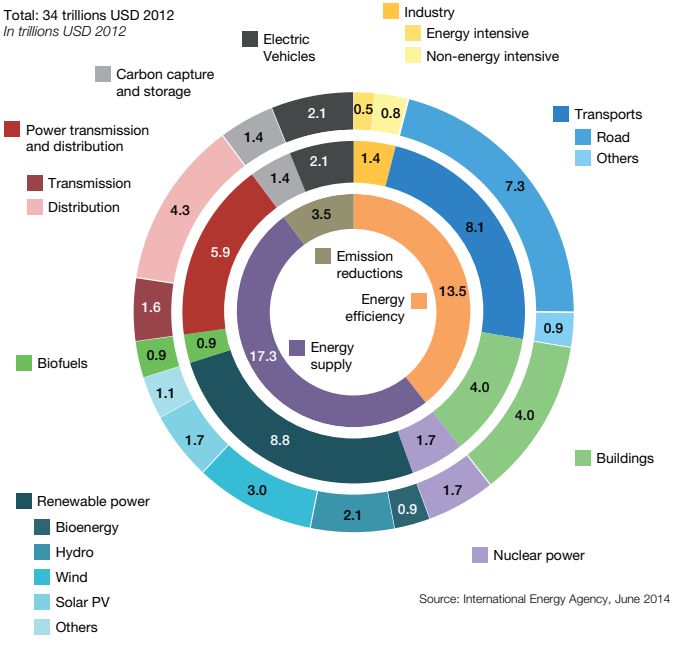
> In 2014, European negotiations focused on the definition of a new Energy/Climate package for 2030. It would be the basis of the European commitment for the new global agreement expected in Paris in December 2015.

In %

Country	Objectives		Share of energy from renewable sources in gross final consumption of energy in 2012
	Member State GHG emissions limits in 2020 compared to 2005 GHG emissions levels for non EU-ETS sectors	Target for share of energy from renewable sources in gross final consumption of energy in 2020	
Austria	–16	34	32.1
Belgium	–15	13	6.8
Bulgaria	20	16	16.3
Cyprus	–5	13	6.8
Czech Republic	9	13	11.2
Denmark	–20	30	26.0
Estonia	11	25	25.8
Finland	–16	38	34.3
France	–14	23	13.4
Germany	–14	18	12.4
Greece	–4	18	13.8
Hungary	10	13	9.6
Ireland	–20	16	7.2
Italy	–13	17	13.5
Latvia	17	40	35.8
Lithuania	15	23	21.7
Luxembourg	–20	11	3.1
Malta	5	10	1.4
Netherlands	–16	14	4.5
Poland	14	15	11.0
Portugal	1	31	24.6
Romania	19	24	22.9
Slovakia	13	14	10.4
Slovenia	4	25	20.2
Spain	–10	20	14.3
Sweden	–17	49	51.0
United Kingdom	–16	15	4.2

Source: European Commission, 2009 and Eurostat, 2012

Global investments needed in clean low-carbon technologies between 2014 and 2035 according to the IEA's 450 scenario[1]



Source: International Energy Agency, June 2014

> In order to restrain global warming under 2°C, a significant amount of investments – more than one trillion dollars per year by 2035 – must be dedicated to low-carbon projects. This amount is to be divided between energy supply and demand.

> At the same time, investments in fossil fuels are needed to maintain and develop energy access across the world. Nevertheless, they have to be limited in order to achieve the 2°C target. Thus, three trillion dollars of investments expected in fossil fuels in a business-as-usual scenario, should be redirected to low-carbon technologies by 2035.

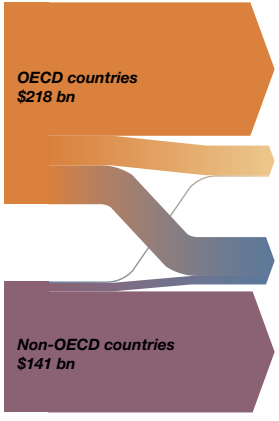
1. The 450 scenario is made of simulations enabling the achievement of the limitation of the global warming under 2°C by stabilizing GHG concentrations in the atmosphere below 450 ppm by 2050. According to the IEA, thanks to energy savings, the 450 scenario – the most virtuous – needs less investments, including all kinds of energy.

Climate Finance in 2013

76% of all climate finance is spent by countries **entirely within their own borders**

Source *Destination*

OECD countries total: $177 bn



40% of all climate finance is spent by OECD countries **entirely within their own borders**

9% flows to OECD countries from international sources, **largely from other developed nations**

15% flows to non-OECD countries from international sources, **OECD countries to non-OECD countries flows comprise 12% of all climate finance**

36% of all climate finance is spent by non-OECD countries **entirely within their own borders**

non-OECD countries total: $182 bn

Source: Climate Policy Initiative, 2014

> "Climate Finance" is the generic name of all financial flows leading to the implementation of actions with a positive impact on climate change mitigation – GHG emissions reduction – or adaptation. Depending on different organizations and definitions, some distinctions may exist based on the level of impact and on whether it is a cobenefit or the main objective of the financed action.

> The accounting rules of the commitment taken in Cancun, to mobilize USD 100 Bn per year by 2020 (see page 34), are not finalized yet. Nevertheless, the Climate Policy Initiative estimates that climate finance from public sources spent in 2012 by developed countries in developing countries amounts to between 34 and 47 billion dollars.

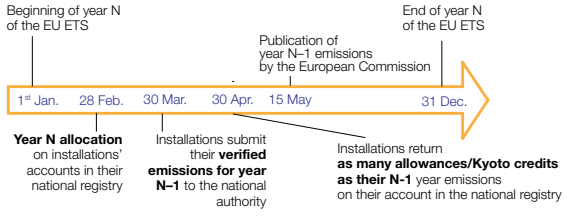
The European Carbon Market (EU ETS)

How the EU ETS Works

> Since 2005, the EU ETS sets a cap to the CO_2 emissions of about **11,400 industrial installations.** These installations are accountable for nearly **50% of the European Union's CO_2 emissions**. Since 2013, as the application perimeter is extended to new sectors and greenhouse gases, 16,400 installations and all intra-EU flights are now constrained by this policy.

> Every year, these industrial installations have to return as many allowances (1 allowance for 1 ton of CO_2 emitted) as their verified emissions of the previous year. Since 2008, EU ETS installations have also been allowed to use Kyoto offset credits (CERs or ERUs) up to a limit of 13.5% of their average allocation.

Annual EU ETS calendar



Source: CDC Climat Research

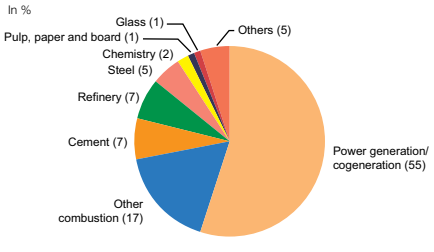
Covered sectors

> Initially, the EU ETS only covered CO_2 emissions. Since 2013 onwards, the emissions of N_2O and SF_6 from the chemical and aluminum sectors are also covered.

> The energy sector (power and heat production, refinery, coke furnaces) is the largest sector in the EU ETS. Electricity producers account for almost **half of covered emissions.**

> In 2008, **Norway**, **Iceland** and **Liechtenstein** joined the other 27 European member states in participating in the EU ETS. **Croatia** joined in 2013.

EU ETS emissions by sector in 2013 (total : 1,925 Mt CO_2e)



Source: CITL, CDC Climat Research

Allowance Allocation

> During the two first periods of the EU ETS – the "trial phase" of 2005-2007, and 2008-2012, corresponding to the Kyoto commitment period – EU ETS-covered installations received an annual allocation of emissions allowances, generally free of charge, which has been fixed by **National Allocation Plans (NAP)**, established under the supervision of the European Commission.

> In phase 3 (2013-2020), the allocation of allowances will be centralized and determined by the European Commission. The emissions reduction target of the EU ETS sectors has been fixed at -21% for the 2005-2020 period **(–1.74% per year).**

Fewer and Fewer Free Allocations

> The share of auctioned allowances in the allocation was 0.13 % in phase 1 and 3.6% in phase 2. Since 2013, the share of allowances is extended to:

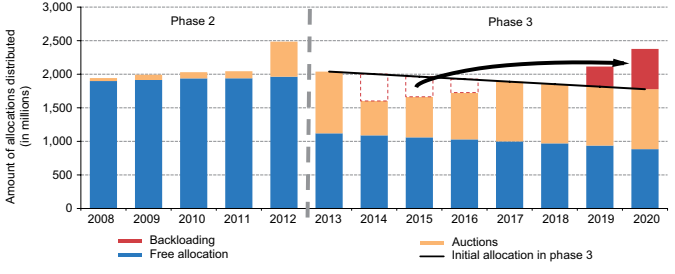
- 100% of the allocation for power generators excluding temporary exemptions for eight countries from Central and Eastern Europe;
- 20% of the emissions cap for other sectors, but steadily increasing to 70% in 2020 and 100% in 2027.

> Free allocations are set according to benchmarks. Industrial sectors and subsectors that are identified as being exposed to a significant risk of carbon leakage[1] by the European Commission will receive 100% of free allocation by 2020.

> Ultimately, after the "backloading" decision, revising the auction calendar and voted in July 2012, at least 30% of allowances will be auctioned from 2013 and up to 75% in 2027.

> Countries may decide to pool the organization of auctions but the resulting revenue will be managed by each state.

Estimation of the evolution of total EU ETS allowance allocation during phases 2 and 3 (excluding aviation)



Source: CDC Climat Research based on data from the European Commission

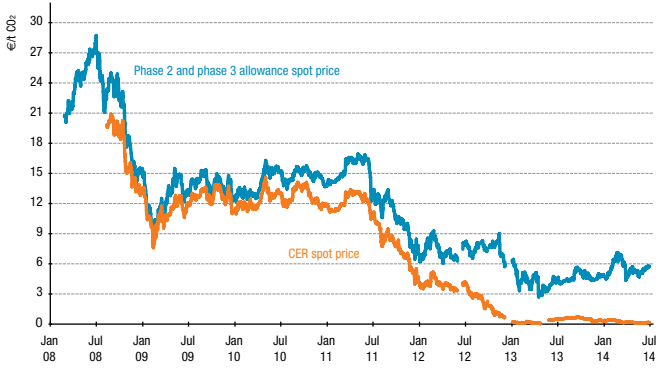
1 Carbon leakage is defined as relocations in order to avoid carbon regulation.

Trading Carbon Allowances

> European Union Allowances (EUAs) are tradable: a company emitting more than its allocation can purchase allowances on the market. Conversely, a company which reduces its emissions can sell its unused allowances. The decision depends upon the carbon price on the market. Emissions reductions will therefore occur where and when they are the least costly.

> EUA buyers and sellers exchange either through bilateral contracts – **"over-the-counter" trades** – or through **exchange platforms**, electronic portals which publicly list prices and quantities.

Carbon Price History



Note: Breaks in the curve are due to temporary closure of exchange platforms and of the registry.

Source: BlueNext, ICE

> **Spot prices** are for immediate delivery of allowances or CERs; **forward prices** represent the current price of allowances or CERs delivered at a later date.

> The allowance price is driven by several factors such as the economic context, 2020 energy policies on energy efficiency and renewable energy, modifications in the supply of allowances as well as the lack of visibility on post-2020 climate regulations and the modifications in market regulations. The Kyoto credits (CERs and ERUs) are close to reaching their threshold of maximal use (see page 42). That explains the decorrelation with the prices of EUAs from 2012.

Long-Term Targets

> France has one of the lowest GHG emissions per capita as per GDP unit, amongst the industrialized economies. This is due to the major share of low-carbon nuclear energy in its electricity generation mix. In line with the IPCC recommendations, France sets a national objective of dividing its GHG emissions by four by 2050 compared to 1990. In 2012, the country's GHG emissions were 12% lower than 1990 levels.

> Implemented policies would lead to a decrease of 18% of France's emissions between 2005 and 2020. It would be –15% for non EU ETS sectors, meaning France would overshoot its –14% target set in the EU's Energy/Climate Package. In 2013, renewable energies represented 14,2% of the French final energy consumption.

Main Policies and Measures

> **Energy sector:**
- Energy saving certificates (ESC) targeting a 345 TWh cumac[1] saving between 2010 and 2013 and at least 200 TWh cumac per year after. As of the 31st of May 2014, a total of 9,344 decisions were issued to 1,256 beneficiaries for a volume of 530 TWh cumac;
- Implementation of the EU's eco-design, the carbon labeling and the EU ETS Directives;
- Boiler-scrapping bonus: 12,000 boilers have been replaced in 2011 saving the equivalent of 80 GWh/year;
- Development of renewable energies.

> **Buildings sector:**
- New 2012 thermal regulation for newly-built buildings, with the generalization of low energy buildings with a consumption below 50 kWh/m²/year on average;
- "Sustainable development" tax credit extended until 2015, Zero Interest Eco-Loans to give private individuals incentives to renovate existing buildings and VAT discount for thermal renovations;
- New investment plan for housing with a target of 500,000 renovated houses per year. It includes notably an acceleration in the renovation of social housing with a target of 120,000 renovations per year from 2017.

> **Transport sector:**
- Stronger bonus-malus on new vehicles that subsidizes the purchase of low-emitting vehicles (less than 90 g CO_2/km in 2014) and taxes the purchase of high-emitting vehicles (more than 130 g CO_2/km in 2014). Hybrid vehicles benefit from a special measure.

1. TWh cumulated and discounted: unit of measure for energy savings induced by a given action. Yearly energy savings are summed up disand counted and discounted over the lifespan of the action.

Examples of Emission Factors

Transport

Traveling 1,000 km (approximately round trip Paris-Amsterdam) results in:

> **0.21 tCO_2 by car (French average), 213 gCO_2/km**[1]. Increasing the number of passengers proportionately reduces emissions.

> **0.31 tCO_2e by plane** with an aircraft at 75% capacity. The shorter the flight, the more GHGs it emits per kilometer as takeoff and landing are comparatively more intensive in fuel use[1].

> **0.07 tCO_2e by train.** Rail emissions depends on the energy source. In France, emissions are low (9 gCO_2/km) since electricity is mainly produced by nuclear plants[1].

Electricity Production and Consumption

A standard 250 MW-capacity power plant operating as a baseline (*i.e.* 8,000 h/year) releases:

> **1.7 $MtCO_2$/year** for a coal-fired power plant (0.87 tCO_2/MWh, corresponding to a thermal efficiency rate of 40%)[2].

> **0.72 $MtCO_2$/year** for a gas power plant (0.36 tCO_2/MWh, corresponding to a thermal efficiency rate of 55%)[2].

1.5 tCO_2/year are emitted by each European household[2, 3] for lighting, heating and electrical appliances at home.

Industry

A typical steelworks producing 1Mt of steel per year emits on average:

> **1.8 $MtCO_2$/year** for a **standard steel chain** (1.8 tCO_2 per ton of steel)[3].

> **0.5 $MtCO_2$/year** for an **electric steel chain** (recast waste) (0.5 tCO_2 per ton of steel corresponding to the indirect emissions due to electricity)[3].

Among other industries that emit CO_2:

> **0.35 $MtCO_2$/year** for a typical cement plant producing 500 000 tons/year (0.7 tCO_2 per ton of cement)[4].

> **0.09 $MtCO_2$/year** for a typical glass plant producing 150 000 tons/year (0.6 tCO_2 per ton of glass)[5].

Forestry and Agriculture

> **580 tCO_2e** are issued per hectare of tropical forest from deforestation (burning and decomposition)[6].

Agriculture emits on average in France:

> **3 tCO_2e/year per dairy cow** due to enteric fermentation[7].

> **0.5 tCO_2e/year per pig** due to of its dejections[7].

Energy

> Main fuels emission factors are on page 33.

1. Source: Ademe, Base carbone. 2. Source: AIE. 3. Source: European Commission. 4. Source: Cement Sustainability Initiative. 5. Source: Fédération des chambres syndicales de l'industrie du verre. 6. Source: IPCC. 7. Source: Citepa.

Glossary of Terms

AAU:
Assigned Amount Unit.

Allowance:
Accounting unit for the emissions trading systems. Represents one ton of CO_2.

Annex I and Annex B Countries:
UNFCCC Annex I countries include developed countries and those in transition towards a market economy. They make up the majority of the Annex B countries of the Kyoto Protocol who have accepted fixed reduction targets.
The only deviations are the following: Croatia, Liechtenstein, Monaco and Slovenia are part of the Annex B; Belarus and Turkey are not.

Anthropogenic Activities:
Induced by human activities (industry, agriculture, etc.)

CER:
Certified Emission Reductions, tradable carbon credit stemming from emission reductions in CDM projects.

CDM:
Clean Development Mechanism.

CO_2 equivalent:
Method of measuring greenhouse gases based on the global warming potential of each gas relative to that of CO_2.

ERU:
Emission Reduction Unit, tradable carbon credit stemming from emission reductions in JI projects.

Fuel Switch:
Switching from a high-emissions fuel to a lower-emissions fuel.

GDP:
Gross Domestic Product. Measure of the wealth created by a country over a given period. Measured in purchasing power parity (ppp), it allows for acurate comparison between countries.

GHG: Greenhouse gas

International Shipping:
Sector gathering the emissions from international aviation and maritime transport.

IPCC:
Intergovernmental Panel on Climate Change. Research group led by the World Meteorological Organization and by the UNEP (United Nations Environment Program), responsible for establishing a compendium of scientific research on climate change.

JI: Joint Implementation.

KP-CP1 / KP-CP2:
Respectively the first and second Commitment Period of the Kyoto Protocol

LULUCF:
Land Use, Land Use Change and Forestry.

toe:
Ton of oil equivalent. Unit of measure of energy.

UNFCCC:
United Nations Framework Convention on Climate Change.

Units

1 T 1 trillion	**1 G** 1 billion	**1 M** 1 million
1 ppm 1 part per million	**1 ppb** 1 part per billion	**1 ppt** 1 part per trillion

Energy Units

See: *"Les chiffres clés de l'énergie édition 2013 - Repères"*, published by the SOeS.

Useful Links

Adaptation Portal
National Observatory on the Effects of Global Warming ..... *www.onerc.gouv.fr*

Ademe
French Environment and Energy Management Agency ..... *www.ademe.fr*

CDC Climat Research ..... *www.cdcclimat.com/research*

CITEPA
Centre interprofessionnel technique d'études
de la pollution atmosphérique ..... *www.citepa.org*

Climate Economics Chair
CDC Climat & Paris-Dauphine University ..... *www.climateeconomicschair.org*

Drias les futurs du climat
Météo-France, IPSL, CERFACS ..... *www.drias-climat.fr*

European Commission ..... *http://ec.europa.eu*
CITL - Community International Transaction Log ..... *http://ec.europa.eu/environment/ets*
Directorate General for Climate Action ..... *http//ec.europa.eu/dgs/clima*

EEA
European Environment Agency ..... *www.eea.europa.eu*

IEA
International Energy Agency ..... *www.iea.org*

IPCC
Intergovernmental Panel on Climate Change ..... *www.ipcc.ch*

MEDDE
Ministry of Ecology,
Sustainable Development and Energy ..... *www.developpement-durable.gouv.fr*
Department of the Commissioner General
for Sustainable Development – SOeS ..... *www.statistiques.developpement-durable.gouv.fr*
General Directorate for Energy and Climate ..... *www.developpement-durable.gouv.fr/energie*

NOAA
National Oceanic and Atmospheric Administration ..... *www.noaa.gouv*

Paris-Dauphine University – CGEMP
Center of Geopolitics of Energy and Commodities ..... *www.dauphine.fr/cgemp*

UNEP - Risø ..... *www.uneprisoe.org*

UNFCCC
United Nations Framework Convention on Climate Change ..... *http://unfccc.int*

WRI
World Resources Institute ..... *www.wri.org*

The figures and data whose source is "IPCC, 3rd Working Group, 2014" are extracted from *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.*
It concerns especially the Figures 1.3 (p.13 of the present *Highlights*), 1.8 (p.14), 5.14 (p.23) and the table 1.1 (p.13) of the report.

The figures and data whose source is "IPCC, 1st Working Group, 2013" are extracted from *Climate Change 2013: The Physical Science Basis. Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*.
It concerns especially the Figures SPM.1 (p.2 of the present *Highlights*), SPM.3 (p.3), 4.19 (p.4), 6.25 (p.5), SPM.7 (p.5), 12.23 (p.6), 13.20 (p.6) and FAQ5-1.1 (p.8) of the report.