



MINISTÈRE
DE LA TRANSITION
ÉCOLOGIQUE
ET SOLIDAIRE

climate change

WHAT'S THAT?

Global surface temperature is rising.

It will probably be 1.5°C higher at the end of the century compared with the pre-industrial era (1850-1900).

Biodiversity, coastal regions, the oceans, health and even our cultural heritage are affected by the impacts of climate change.

This was the essential message of the 5th report of the Intergovernmental Panel on Climate Change (IPCC) published in 2014.

At a time when France is setting itself ambitious targets*, including cutting its greenhouse gas emissions by 40% by 2030, it is essential that everyone understands the complex issues of climate change and the greenhouse effect.

*Bill relating to energy transition for green growth.

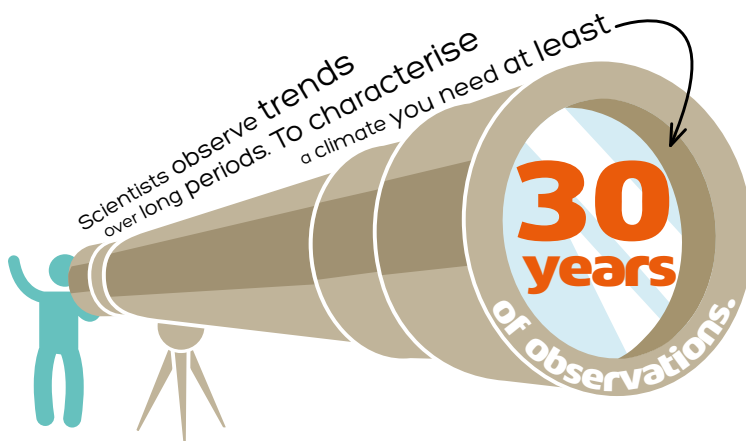
Because in France, like anywhere else in the world, no-one can consider themselves protected. Changes in the behaviour of certain migratory birds, the life cycle of certain plants and an increase in the average sea level already indicate that the impacts of global warming are being felt very close to home.

There is still time to do something about it, but we must act quickly. Solutions already exist at all levels for cutting greenhouse gas emissions (mitigation) and for adapting to the effects of climate change.

A complex PHENOMENON

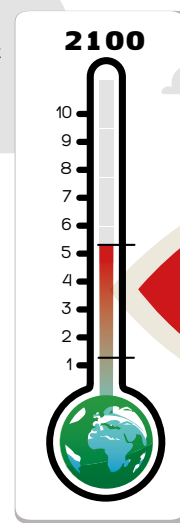
is under way

In 2012 the world's average temperature had risen 0.89°C compared with the average for the 20th century. It could go up to 5.3°C during the 21st century if we do not control our greenhouse gas emissions.



Episodes of exceptional weather (harsh winter or wet summer) merely illustrate short-term climate variability (season, year). This does not call the long-term warming trend into question.

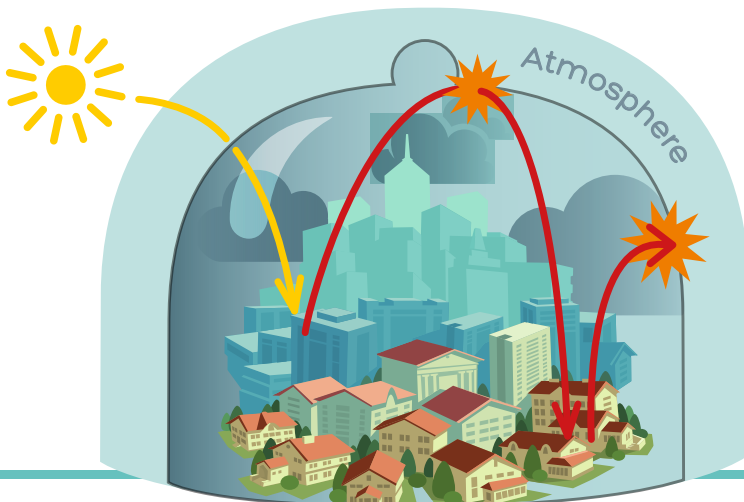
In 2012 the world's average temperature rose 0.89°C compared with the average for the 20th century



In summer it could increase from 1.3° to 5.3° by the end of the 21st century

The greenhouse effect

The greenhouse gases in the atmosphere play an important role in regulating the climate. They prevent a large amount of solar energy (infra-red radiation) being sent into space from the Earth. This is known as the greenhouse effect. Because of this, the average temperature on the Earth is about 15°C . Without it, it would be -18°C .



The impact of human activities

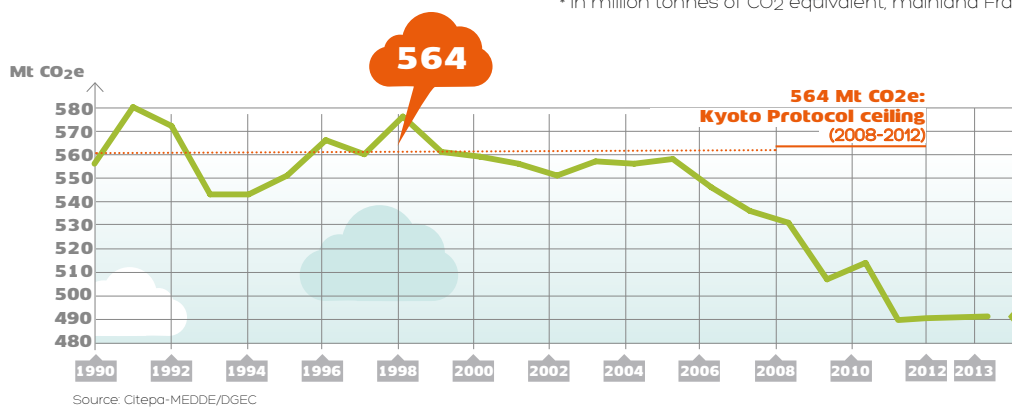
The greenhouse effect is unbalanced by human activities. These cause the concentrations of greenhouse gases in the atmosphere to increase artificially and, consequently, accentuate the warming of our planet. CO_2 (carbon dioxide) accounts for almost $\frac{2}{3}$ of global greenhouse gas emissions caused by human activities. This is why the effect of other greenhouse gases is usually measured in CO_2 equivalent (CO_2e). Current CO_2 emissions will have an impact on concentrations in the atmosphere and on global temperature for decades.

France COMMITTED to the fight

France is one of the industrialised countries with the lowest greenhouse gas (GHG) emissions. It accounts for only 1.2% of global GHG emissions yet it contributes 4.2% of the global GDP.

France's total GHG emissions from 1990 to 2013*

* in million tonnes of CO₂ equivalent, mainland France and overseas departments (excluding land use)



Between 2008 and 2012 France's average annual GHG emissions were 56.2 Mt below the emissions ceiling it had committed to under the Kyoto Protocol. In 2013, they reached 491.5* MtCO₂e. This represents a difference of 13% compared with 1990.

* early estimates

Tackling climate issues in France

Since the end of the 1990s the most actively engaged local authorities have taken voluntary measures, including some aspects of climate policy, particularly in the form of agenda 21 programmes (practical action plans for sustainable development on a regional scale).

National programme to combat climate change (programme national de lutte contre le changement climatique)

1st climate plan enabling France to meet its commitments under the Kyoto Protocol (stabilising emissions between 2008 and 2012 compared with 1990)

National strategy for adaptation to climate change (stratégie nationale d'adaptation au changement climatique)

National plan for adaptation to climate change (plan national d'adaptation au changement climatique)

2014: Parliament's examination of the Bill on the energy transition for green growth

2000

2001

2004

2005

2006

2010

2011

2012

2014

Law making combating the greenhouse effect a national priority and creating the Observatoire national sur les effets du réchauffement climatique (Onerc) (French national observatory on the effects of global warming).

Programme setting the directions of the energy policy (loi POPE of 13 July) and a factor 4 target: 4-fold reduction in greenhouse gas emissions between 1990 and 2050

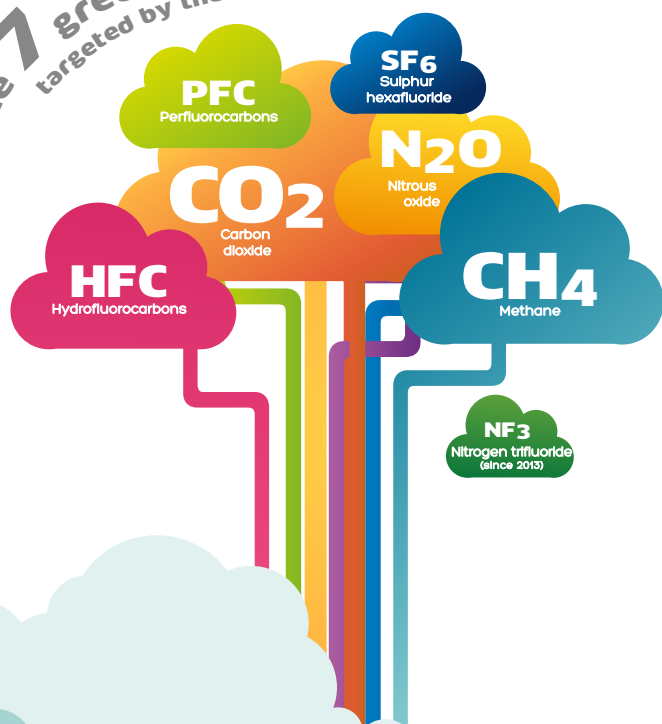
Regional energy and climate plan (plans climat-énergie territoriaux (PCET)) were made mandatory for regional authorities with more than 50,000 inhabitants

Adoption of the first regional climate, air and energy plan (schémas régionaux du climat, de l'air et de l'énergie (SRCAE))

A global ISSUE

Historically, the developed countries have made the greatest contribution to climate change. But nowadays, some emerging countries emit as much greenhouse gases (GHG) per head of population as France.

The 7 greenhouse gases
targeted by the Kyoto Protocol



Meeting the challenge of climate change

At international level

1992

Earth Summit in Rio:
start of global climate
negotiations

1997

Signing of the Kyoto
Protocol requiring 6 GHGs to
be cut by 5.2% by 2012

2015

21st annual conference
of the United Nations on
Climate
Change in Paris

At European level

2001

European Climate
Change Programme

2005

EU
emissions trading system

2008

Climate and energy pack-
age setting the 3 targets
for 2020, known as 3x20:
20% renewable energy, 20%
reduction in energy consump-
tion, 20% cut in GHGs

Emissions per head of population of the main GHG emitting countries in 2011*

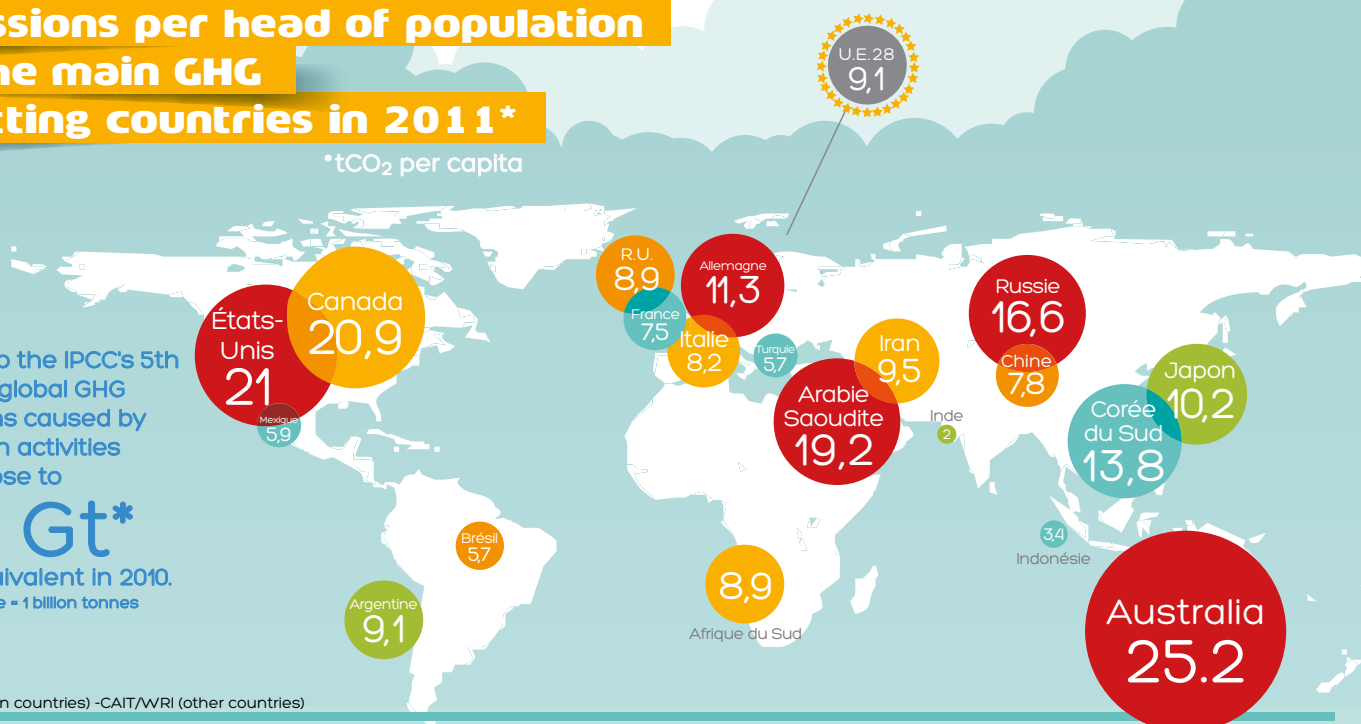
*tCO₂ per capita

According to the IPCC's 5th
report, global GHG
emissions caused by
human activities
rose to

49 Gt*

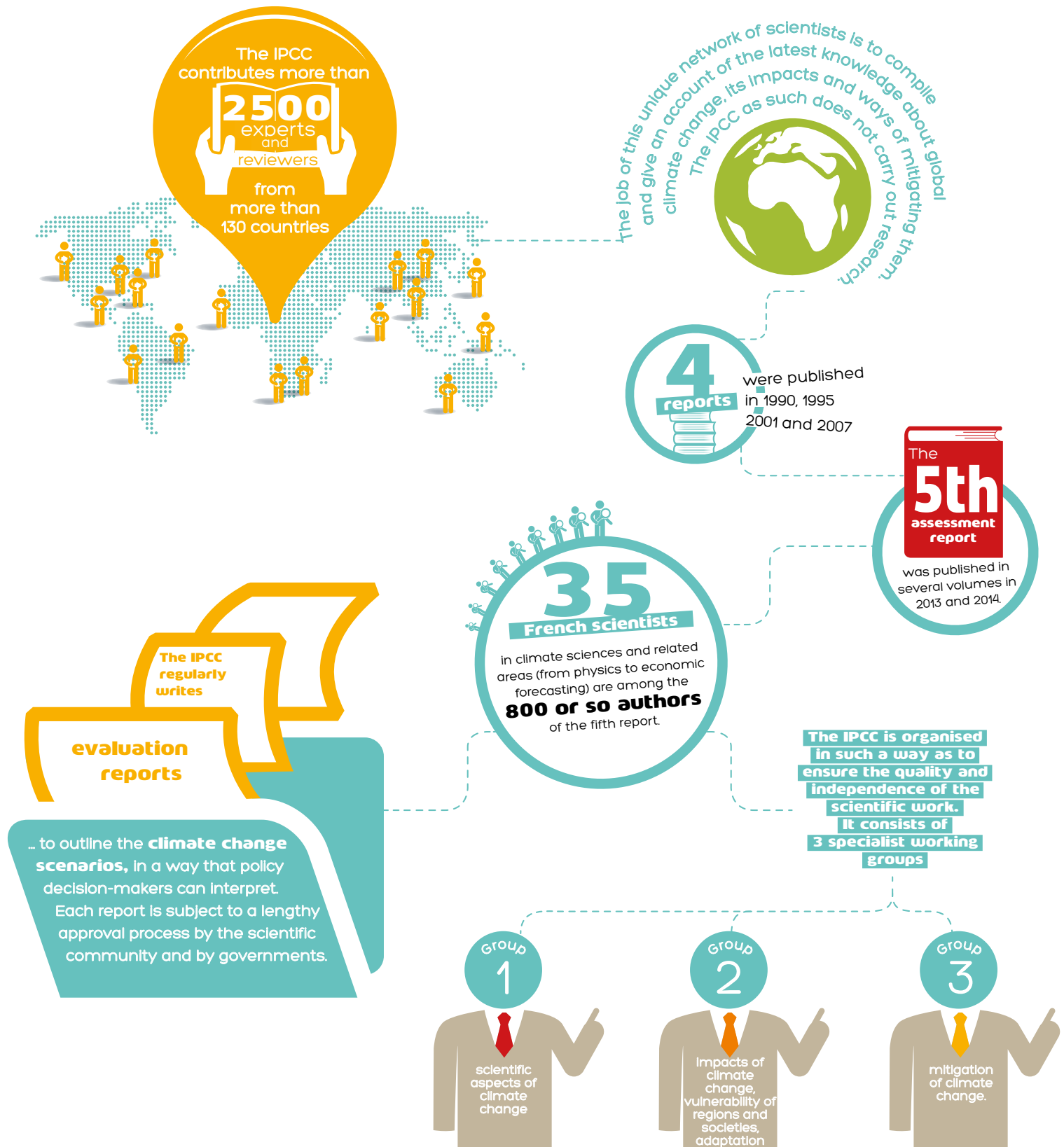
of CO₂ equivalent in 2010.

* 1 gigatonne = 1 billion tonnes



WHAT IS the IPCC?

At the international level, the Intergovernmental Panel on Climate Change (IPCC) was created in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP).



IMPACTS

already visible

Climate change is a reality. Disturbances are already being seen in the ecological balance of large ecosystems: a changing physical environment and living things that are trying to adapt or disappearing.

We are also beginning to envisage the consequences for human societies: forced migrations, an increase in the number of conflicts (use of water resources, appropriation of fertile soils, etc.).

The main impacts

● The impacts of climate change may vary considerably from one region to another, but they will affect the whole planet. The consequences can already be predicted.

The increase in air temperature is one of the most visible signs of climate change. This is why the term **global warming** is often used.



More frequent extreme weather events :
heat waves, coastal flooding, drought

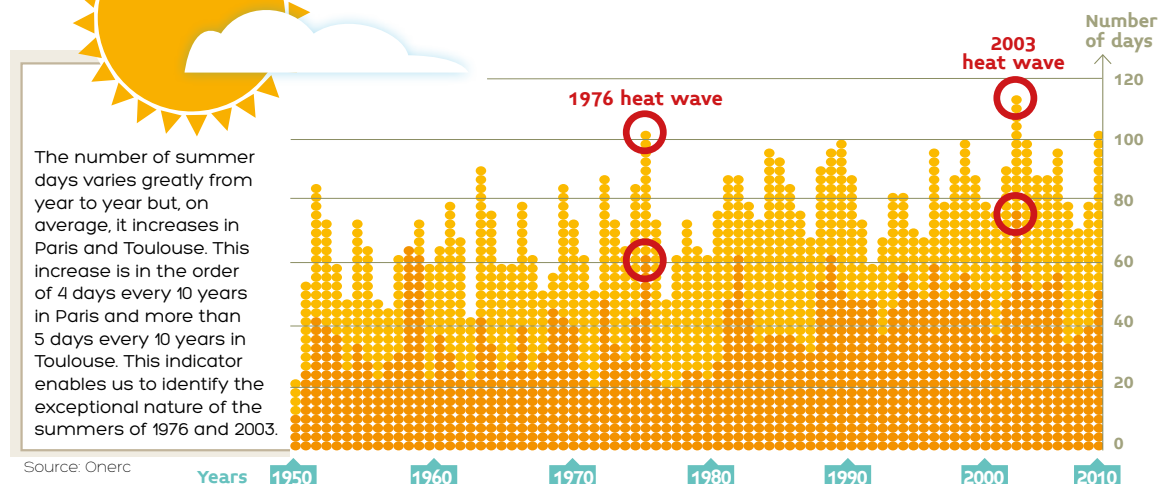
Disturbed ecosystems
20 to 30% of animal and plant species under threat of extinction

Falling agricultural production in many parts of the world

Increased health risks, particularly due to the spread of disease-bearing insects

Rising sea levels

● In France, the number of summer days, i.e. with a temperature over 25°C, increased significantly over the period 1950-2010.
Key: ● Toulouse ● Paris



Impacts already visible in the OCEANS and IN COASTAL AREAS

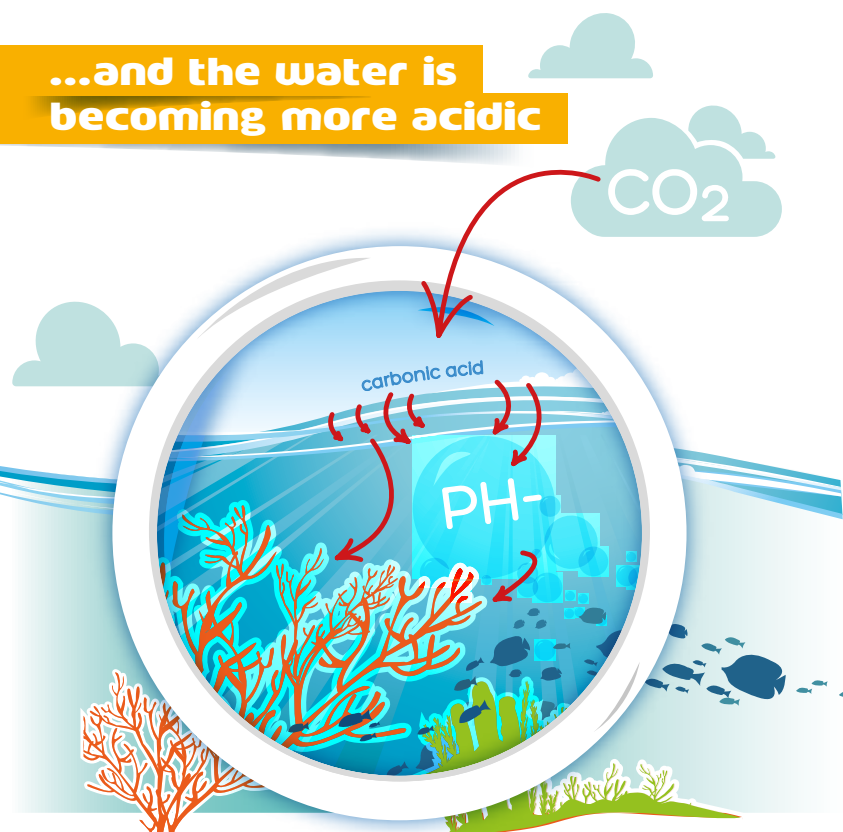
The sea level is rising...

Between 1870 and 2000 the sea level rose **18 cm** globally. 6 cm of that rise was in the last 20 years.



By 2100, the average sea level could rise from **26 cm to 82 cm**. This rise in sea level will affect islands, deltas and very low lying coastal areas such as Bangladesh, the Netherlands or France (Languedoc-Roussillon).

...and the water is becoming more acidic



During the 20th century the only means of observing variations in sea level was to use a tide gauge. With satellites we can now measure 'absolute' sea levels with the precision of several tenths of a millimetre per year.

The increased concentration of CO₂ (carbon dioxide) in the atmosphere leads to greater absorption of CO₂ by the oceans. Consequently, sea water is becoming more acidic, as CO₂ is changed into carbonic acid on contact with the water.

Between 1751 and 2004 the pH (potential hydrogen) of the surface water of the oceans fell from 8.25 to 8.14.

This acidification represents a major risk for coral reefs and some types of plankton, threatening the balance of numerous ecosystems.

Impacts already visible on **BIODIVERSITY**

Many changes have been observed in the natural world: some birds are migrating and starting to lay their eggs earlier, some animal and plant species are moving towards higher latitudes or higher altitudes.

Animal species are moving northwards

● Sensitive to the rise in temperature and probably a growing shortage of certain insects, passerines, such as the wood warbler or the willow tit, are moving to more northerly parts of Europe. In France, their numbers have already fallen by 20 to 80%, depending on the species, over the course of the last twenty years.



28,342
GREYLAG
GEESE
wintered in France
in 2011 compared
with 10 in 1968

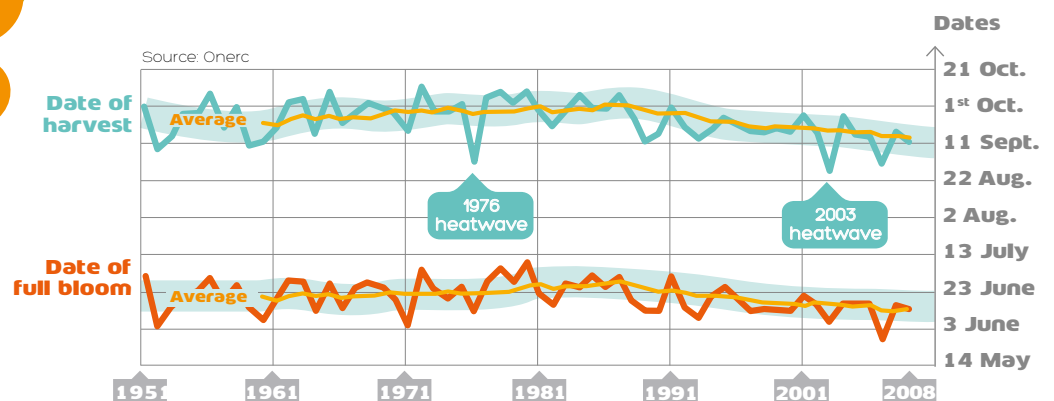
● At the beginning of the 20th century the greylag goose *Anser anser* migrated across France twice a year to winter on the shores of the Mediterranean. Because of global warming it is now able to winter in temperate Europe, including France, as far north as the southern Scandinavia.



Today,
in the Champagne
region, harvesting
takes place

2
WEEKS
earlier than
20 years ago

The life cycles of plants are speeding up



What can we do about it?

MITIGATION

In view of climatic inertia, a rise in temperature by the end of the century is inevitable and all parts of the world are affected. But it is still possible to limit the rise in temperature on the Earth.

no more than

2°C
compared with the
pre-industrial era



This is the aim of member countries of the United Nations Framework Convention on Climate Change, as they think a further rise in temperature would have devastating effects.

Tackling the causes of climate change by controlling greenhouse gas (GHG) emissions, is what is known as mitigation. GHG emissions can be reduced in all sectors.



By building

a house with a wooden framework some 15 tonnes of CO₂ emissions could be saved. Explanation: the wood stores CO₂ (absorbed by the tree when growing) and it replaces materials (PVC, steel, concrete, etc.) that generate much higher emissions in their production.



Energy production

Reduce fossil fuel consumption (coal, oil, gas), control energy consumption (energy efficiency of products and low-carbon economy), develop use of renewable energies, etc.

35%



Industrial production

Promote processes with lower GHG emissions, etc.

18%



Transport

Encourage the use of low-carbon vehicles, pool means of transport, develop means of transport with lower GHG emissions, etc.

14%



14%



Agriculture

Limit the use of nitrogen fertilisers, promote methanisation, etc.

3%



Waste and water treatment

Manage the quantities of waste produced, capture methane emissions, etc.

6%



Residential and commercial buildings

Renovate the existing stock and build new energy efficient buildings, etc.

10%



Tropical deforestation

Only import wood from sustainably managed forests, etc.

Global GHG emissions by sector (%)

What can we do about it?

ADAPTATION

Adaptation policies aim to reduce our vulnerability to the impacts of climate change.

France has had a national climate change adaptation plan since 2011.

The recommended measures concern all sectors of activity around four objectives:

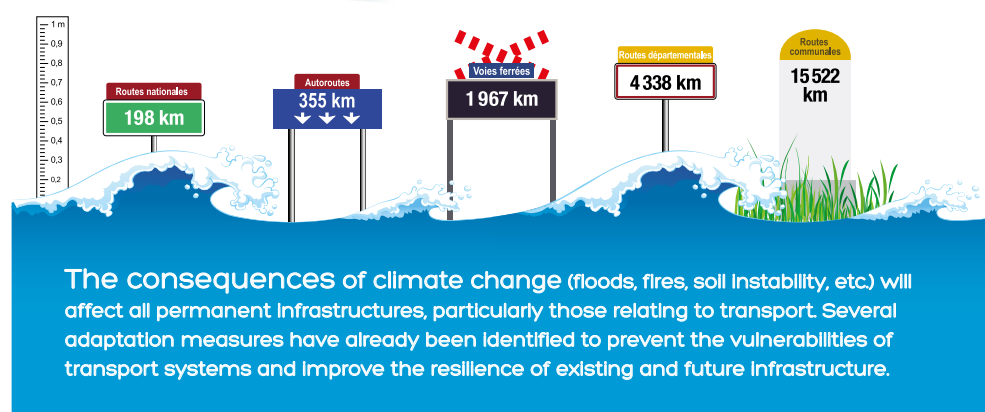
Protecting people and property

Preventing risk inequalities

Cutting costs and reaping benefits

Preserving the natural heritage

Adapting infrastructures



Source: Onerc

Bellegarde-sur-Valserine (Ain) has the first **bioclimatic station**, naturally ventilated summer and winter thanks to a double cupola.

They have found solutions!

Adapting the forests

As well as the increased frequency of exceptional events, certain animal species are spreading and there are also fundamental changes (rising temperatures, lower rainfall, etc.). Preparing forests for the future means improving their resistance to climate change from now on. This can be done by identifying the best adapted tree varieties, keeping forests in good ecological condition and ensuring genetic diversity is as broad as possible.

In Basse-Terre, Guadeloupe, a 1,000m² office block uses a **solar air-conditioning technique**. A system which cuts the electricity consumption needed for air-conditioning by one third each year.

Using **solar-powered air-conditioning** a wine cellar in Banuyls-sur-Mer (Pyrénées-Orientales) has reduced its annual energy consumption by nearly 40%.

THE CULTURAL HERITAGE and climate change

Climate and climate change not only have an impact on the natural heritage but also on monuments and sites.

Historic buildings are intimately linked to their environment. Their durability greatly depends on their stability. The increased frequency of very heavy rainfall, flooding, salt water intrusion and greater instability of the soil (compression / dilatation) are problems for their conservation.

While the architectural heritage of adobe structures is particularly vulnerable, stone structures are also affected by climate change: changes in the cycles of wet and dry periods and periods of freezing and thawing speed up the decomposition of porous materials, including stone. Organic building materials, such as wood, are also under threat from certain parasites which have been observed to be migrating to altitudes and latitudes where they have not been seen until now.

In the north of Canada, the temporary thawing of frozen ground or ice is threatening Inuit villages. By weakening the foundations of homes and infrastructure, many villages are becoming increasingly difficult to live in. Some sites, where human settlement has been attested for 9000 years, are likely to disappear due to the thawing of frozen ground.

Westminster Abbey, United Kingdom

The combined effect of rising sea levels and changes in storm systems threatens the Abbey, which is situated on the bank of the Thames.

Timbuktu, Mali

The great mosques are now threatened by desertification and sand invasion.

Chan Chan, Peru

This archaeological complex, with its adobe buildings, is particularly sensitive to the intensification of heavy rainfall.



For more INFORMATION

WEBSITE

- www.developpement-durable.gouv.fr/onerc

PUBLICATIONS

- The French climate in the 21st century
A series of reference reports
- Onerc annual reports
- Climate and energy efficiency policies.
Summary of France's undertakings and results
- Plan National d'Adaptation au Changement Climatique
(French national plan for adaptation to climate change) (PNACC)

- Le climat change, agissons
Onerc letter to MPs



- Mieux comprendre
le GIEC



- Changement climatique :
impacts en France



There is still
time to
MASSIVELY
CUT our
CO₂ emissions

Find everything you
want to know at:

www.developpement-durable.gouv.fr/onerc