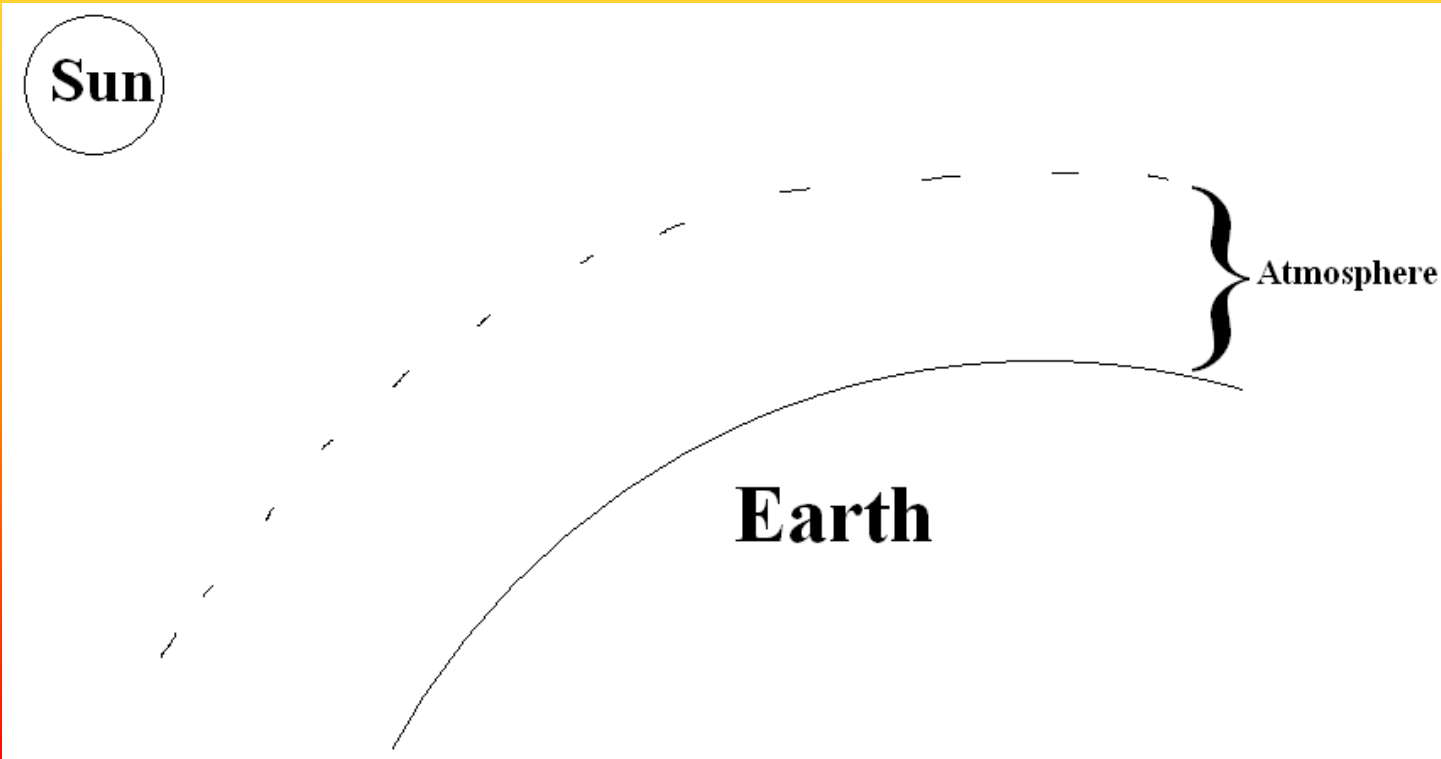
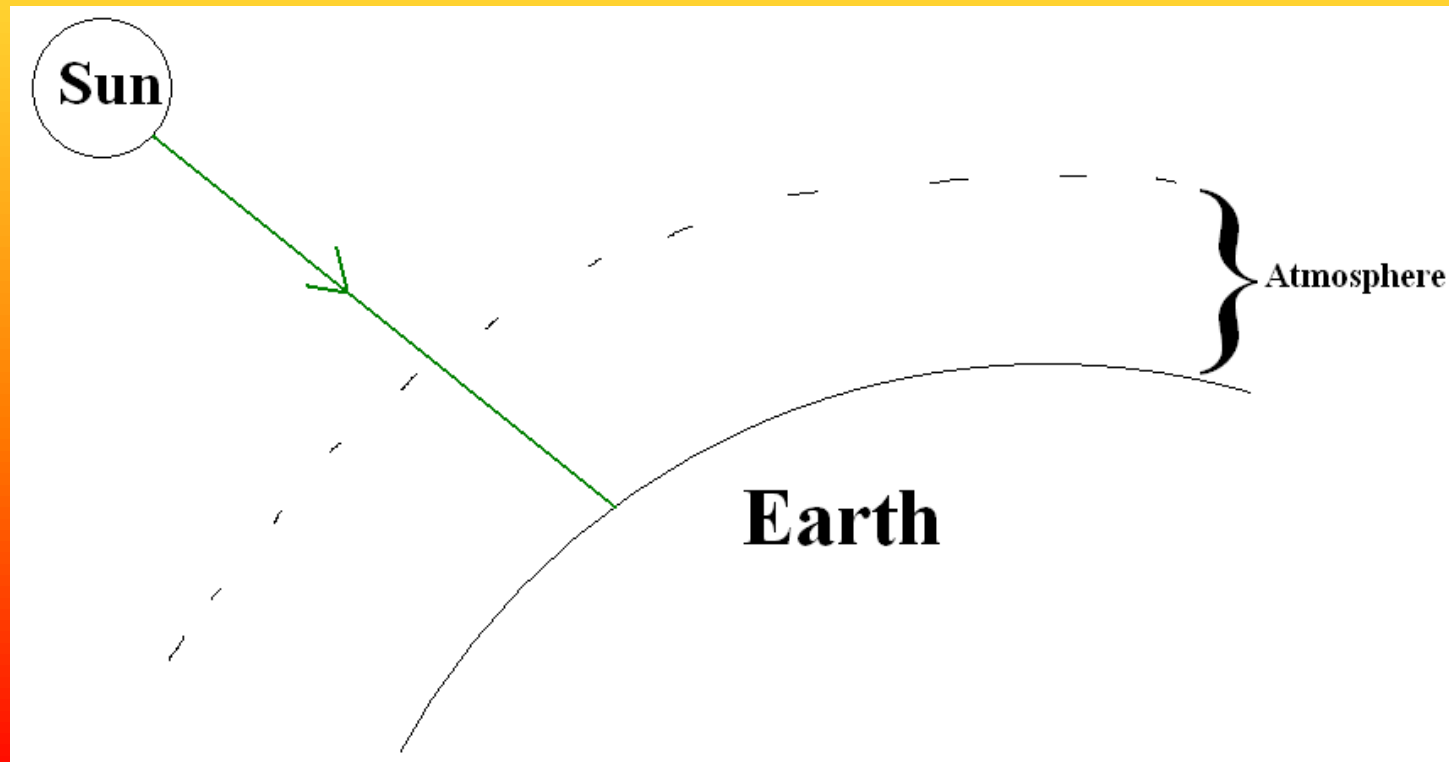


# THE GREENHOUSE GASES

# GLOBAL WARMING

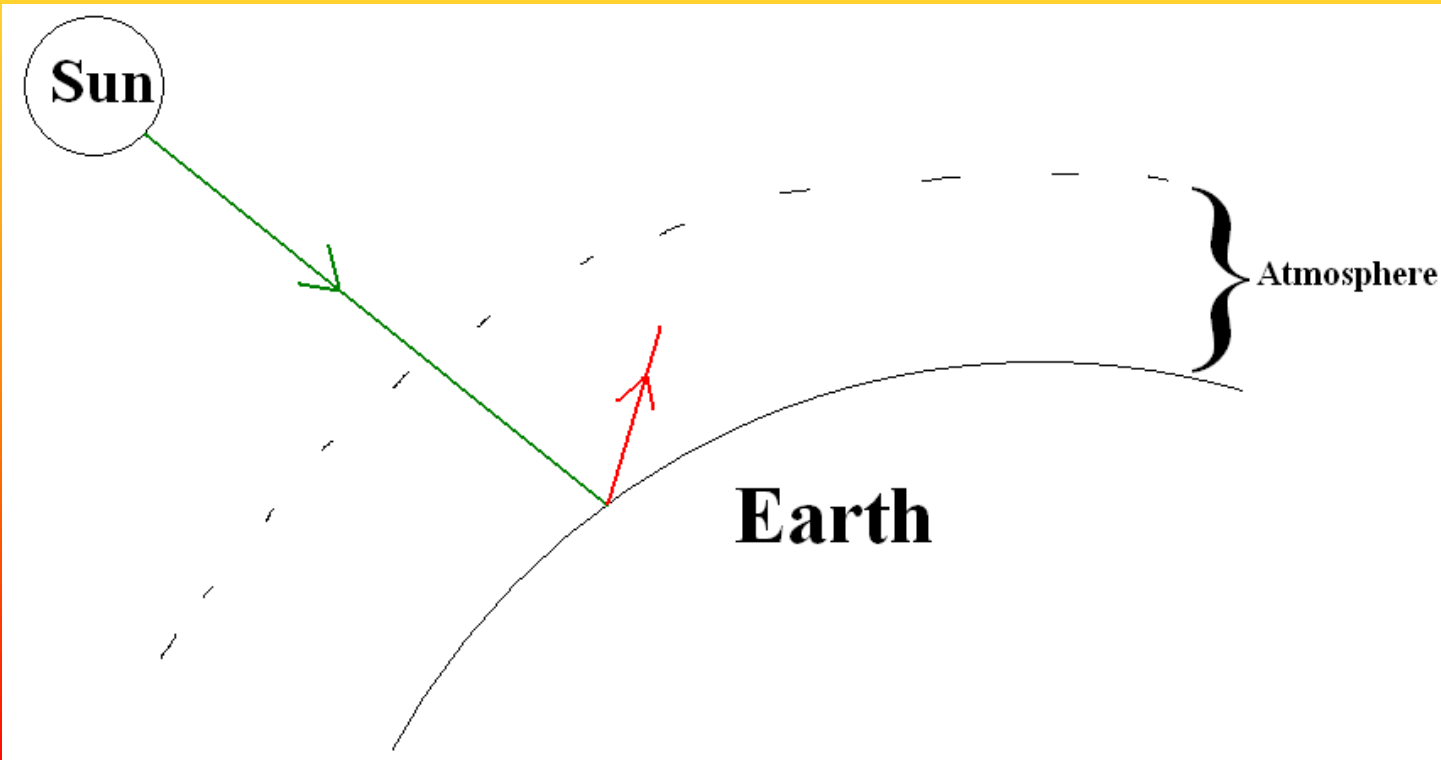


# GLOBAL WARMING



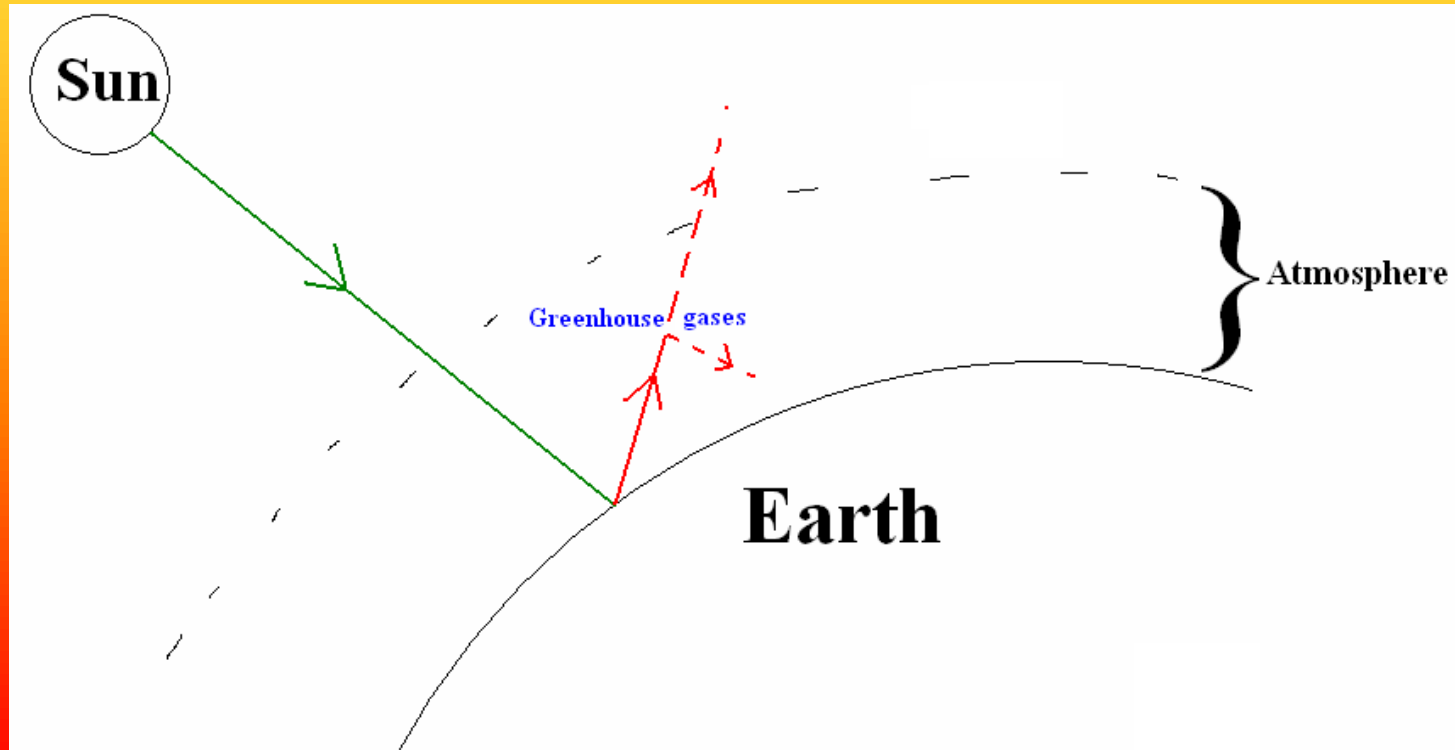
- The sun heats the Earth .

# GLOBAL WARMING



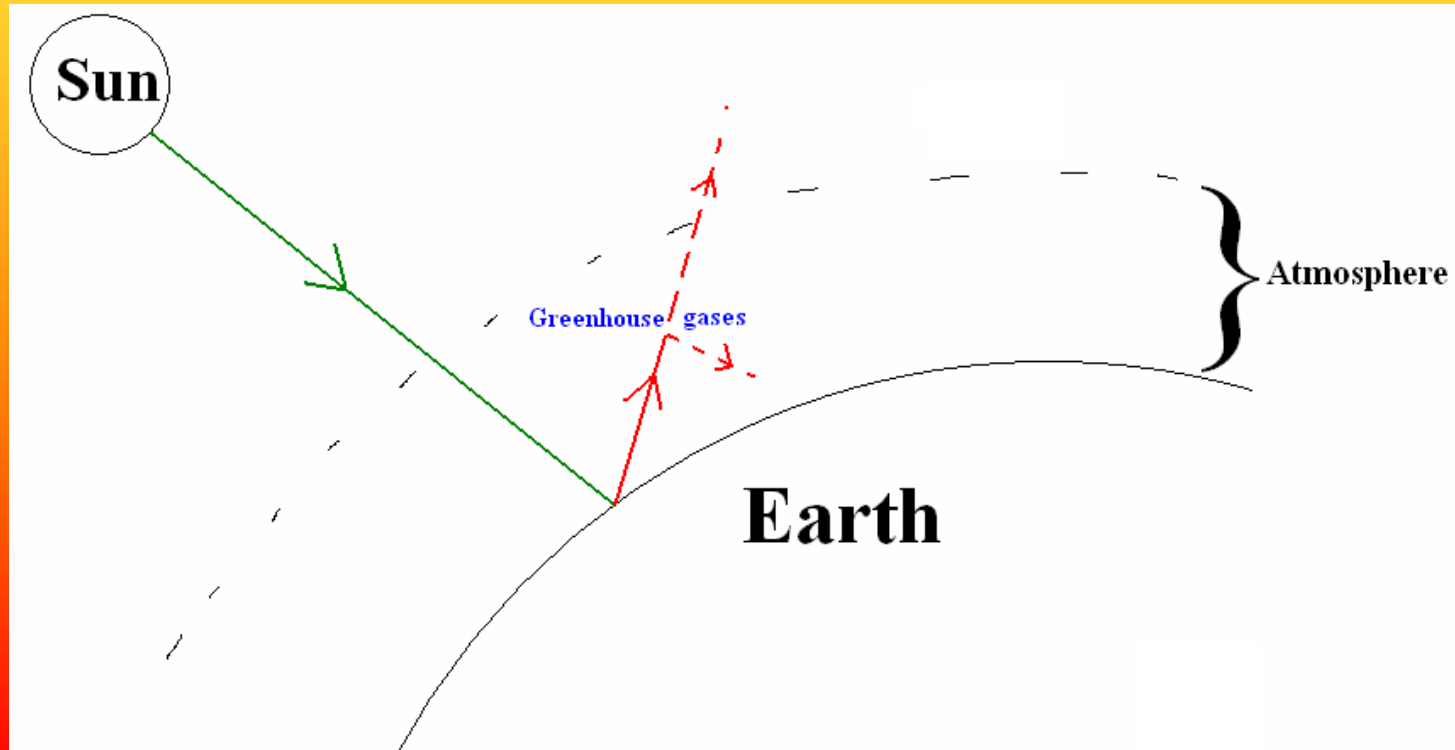
- The Earth loses heat in the form of infrared rays

# GLOBAL WARMING



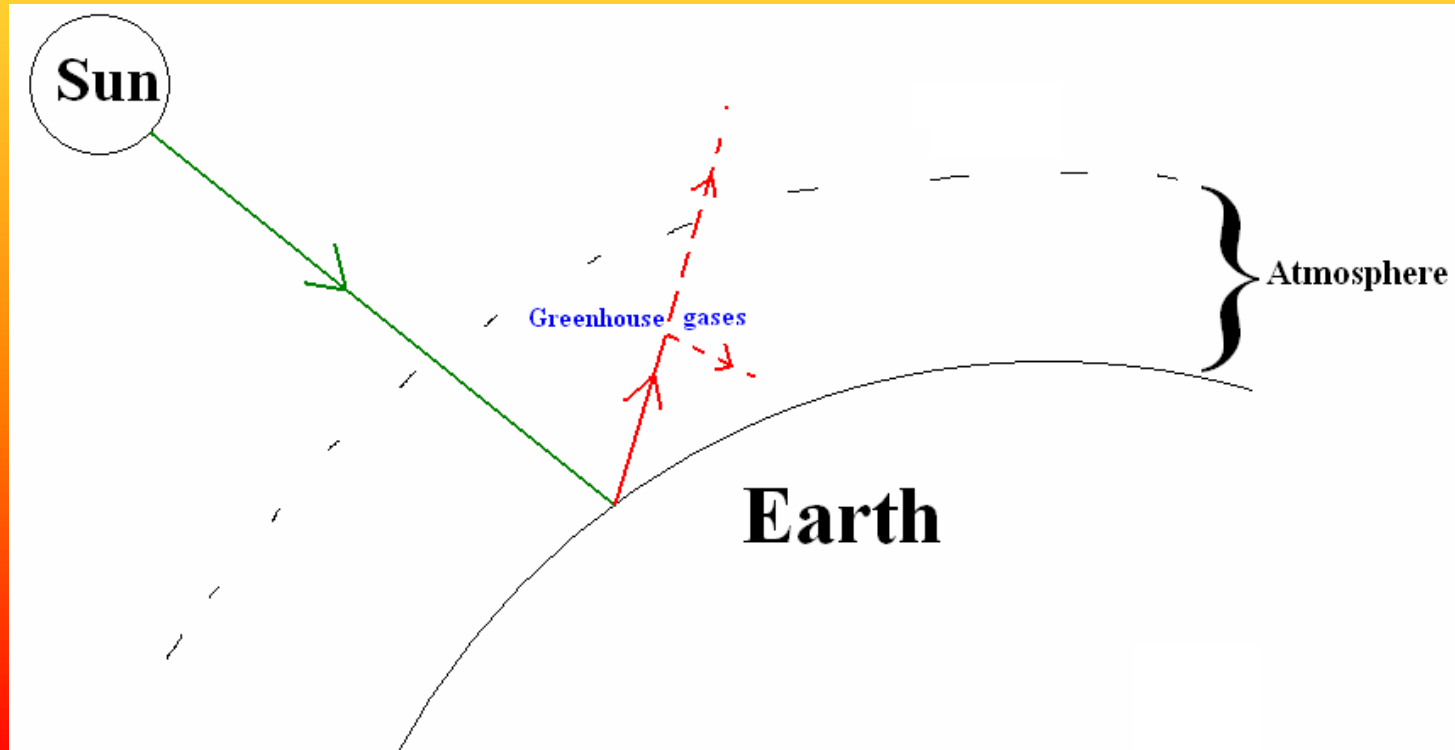
- Some of this heat is blocked by greenhouse gases, maintaining an average temperature of  $15^{\circ}\text{C}$ .
- Unfortunately, there are more and more greenhouse gases in the atmosphere because of human activities.

# GLOBAL WARMING



- A rise in temperature of  $0.9^{\circ}\text{C}$  was observed in France during the 20th century and if nothing is done about it, temperatures will rise even more in years to come.

# GLOBAL WARMING



- But what are these greenhouse gases exactly?

# GREENHOUSE GASES OF THE KYOTO PROTOCOL

Carbon dioxide

Methane

Nitrous oxide

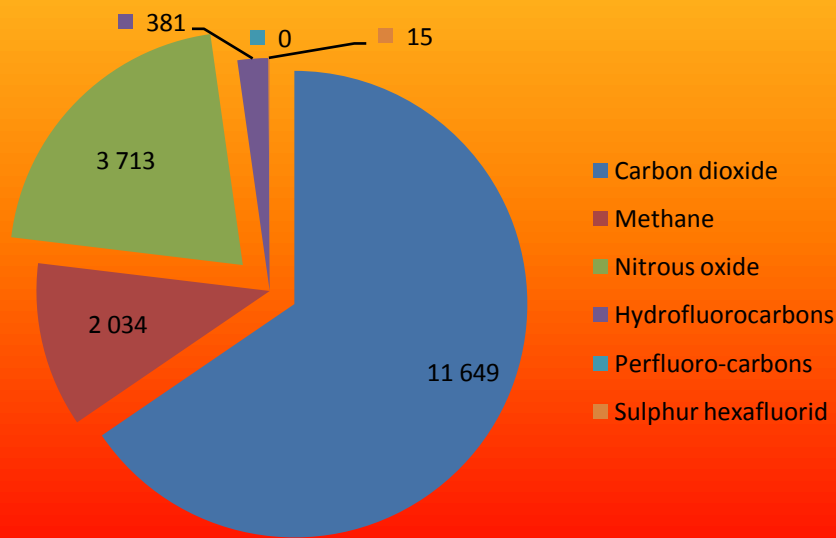
Hydrofluorocarbons

Perfluoro-carbons

Sulphur hexafluoride



# Greenhouse gas emissions in our region POITOU-CHARENTES



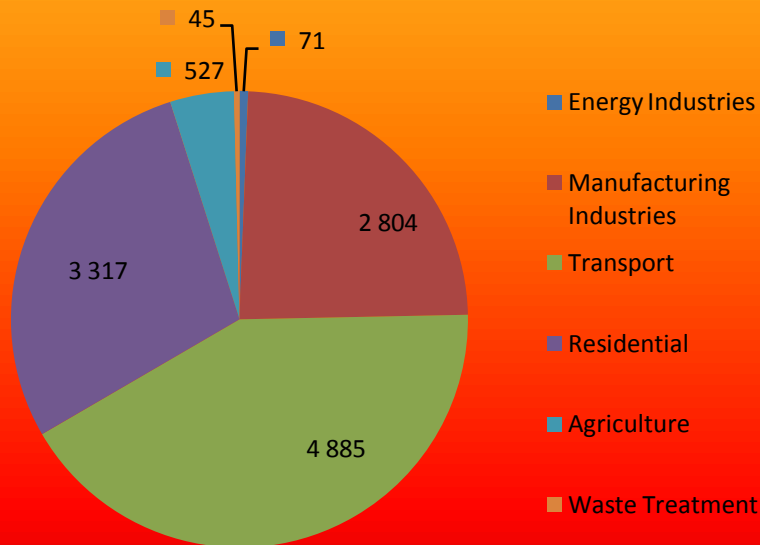
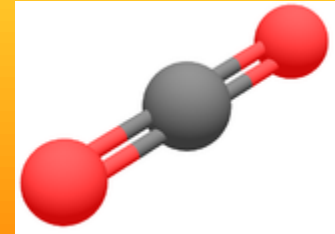
Value in kilo-tons equivalent  
CO<sub>2</sub> in 2005

- A rise of 3% between 1990 and 2005.
- The predominant gas is CO<sub>2</sub> (66%), followed by nitrous oxide (21%) and methane (11%).

Details of the different greenhouse gases

# CARBON DIOXIDE (CO<sub>2</sub>)

The dioxide molecule is composed of 2 oxygen atoms and 1 carbon atom.  
Its life expectancy in the atmosphere is a 100 years.



Value in kilo-tons equivalent  
CO<sub>2</sub> en 2005

- Most CO<sub>2</sub> emissions come from the combustion of fossil fuels (such as petrol, gas and coal) used in transport, in homes and industry.
- In our region, fossil fuel industries account for very little because our electricity is mostly nuclear.

# CO<sub>2</sub> A FEW SOLUTIONS

Cars have been running on petrol for more than a century.

A small car emits on average 195 g of CO<sub>2</sub> per km.



A 100 % electric car in the near future?

The 'Friendly' manufactured by Heuliez in the Deux Sèvres region is due to be commercialized in 2010 at a starting price of 12 000 €.

## Favour :

- Walking and cycling for short journeys (0 g of CO<sub>2</sub> per km).
- Sharing car journeys.
- Using public transport (8 g of CO<sub>2</sub> per km for the train) .



Avoid travelling by plane (220 g of CO<sub>2</sub> per km per person)



# CO<sub>2</sub> A FEW SOLUTIONS

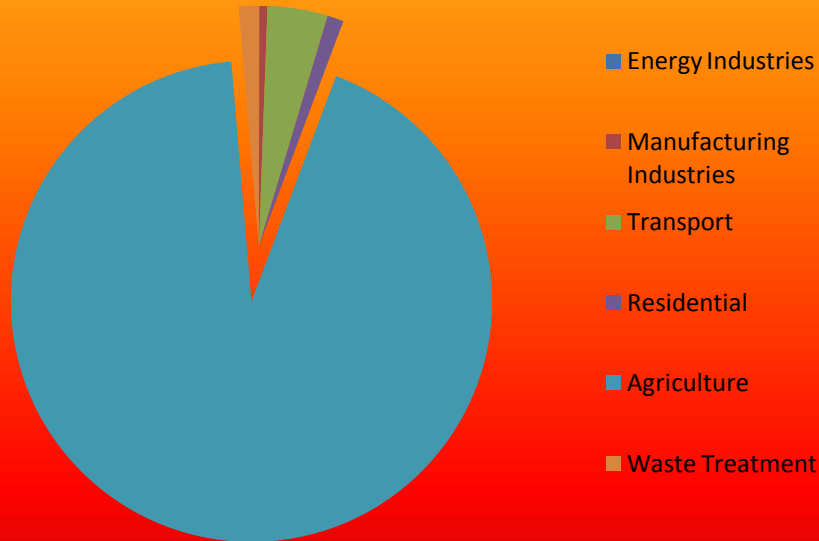
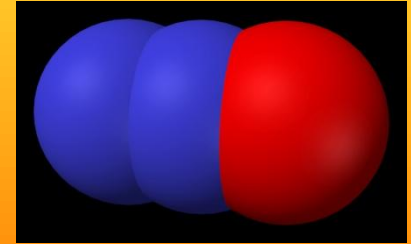
## HOUSING

- Building houses that face south and that are well insulated needing little unnatural heating.
- Producing hot water with help of the sun.



# NITROUS OXIDE (N<sub>2</sub>O)

The nitrous oxide molecule is composed of 2 azote atoms and 1 oxygen atom.  
Its life expectancy in the atmosphere is 120 years.  
Global Warming Potential GWP = 310



Repartition in 2005

- Nitrous oxide accounts for 21% of the greenhouse gas emissions in our area.
- 93% of the nitrous oxide comes from farming (use of fertilizers and dung).
- Its emissions decreased by 9% between 1990 and 2005 because of a more rational use of fertilizers and fewer herds.



# N<sub>2</sub>O

# A FEW SOLUTIONS

## IN FARMING METHODS

- Using fewer fertilizers and helping the development of organic farming methods - which don't use chemical fertilizers that emit so many greenhouse gases.

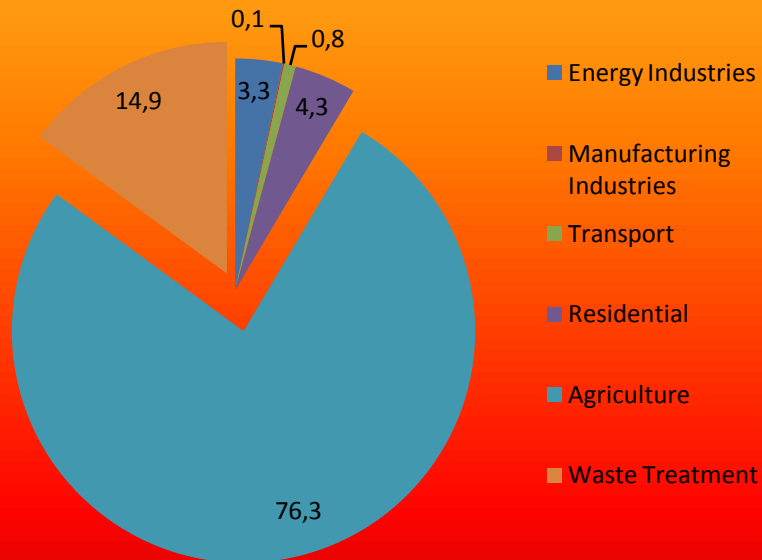
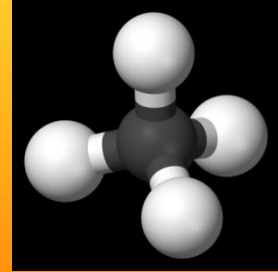




# METHANE (CH<sub>4</sub>)

The methane molecule is composed of 4 hydrogen atoms and 1 carbon atom. Its life expectancy in the atmosphere is 12 years.

Global Warming Potential GWP = 21



Value in kilo-tons in 2005

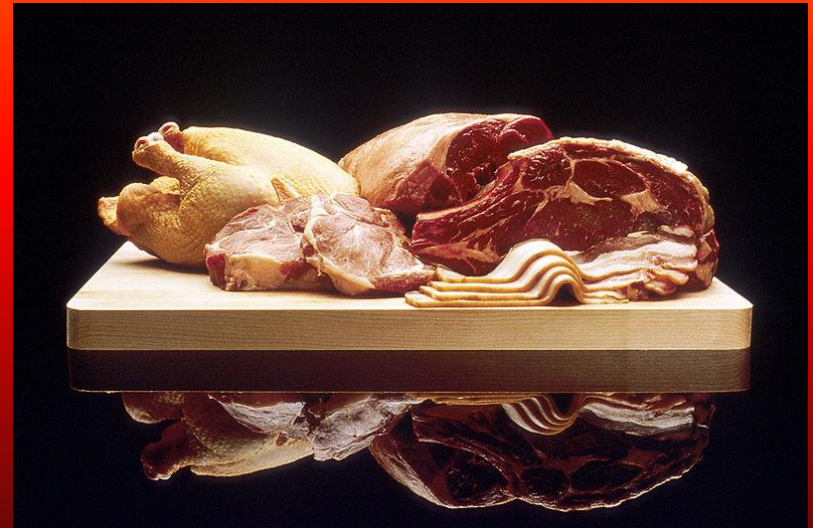
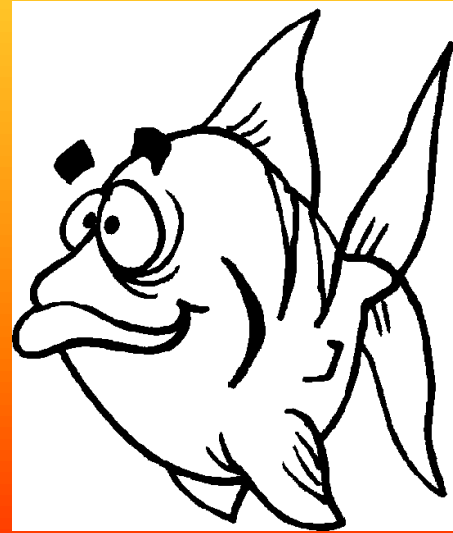
- Methane emissions come mainly from farming, in particular intestinal gases and animal dung. More also comes from waste heaps..
- Methane emissions decreased by 17% between 1990 and 2005 due to fewer herds (especially milking cows).



# METHANE A FEW SOLUTIONS

## EATING LESS MEAT

- Alternate eating meat with eating fish. A kilo of fish emits :
  - Twice as less greenhouse gases than a kilo of farmbred chicken or duck
  - 15 times less greenhouse gases than a kilo of beef.
  - 40 times less greenhouse gases than a kilo of veal or lamb.

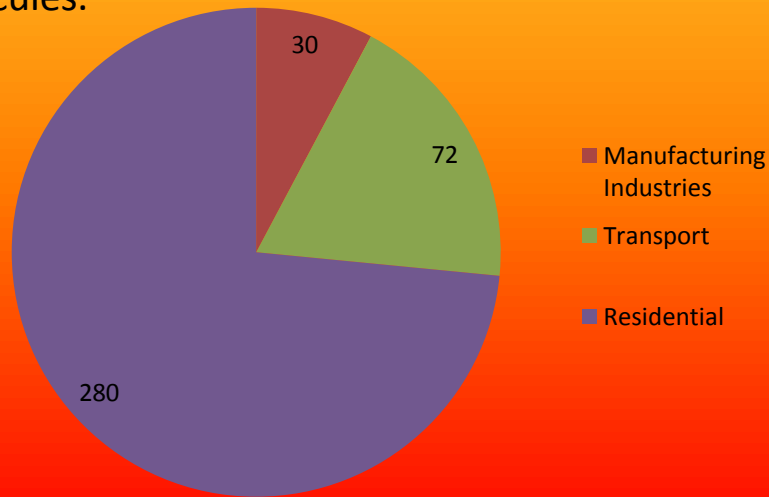




# HYDROFLUOROCARBONS (HFC)

These are fluoride gases composed of carbon atoms, of fluoride and hydrogen.

Global Warming Potential GWP = from 140 to 11 700 depending on the molecules.



- HFC emissions come from insulating foams, air-conditioning, refrigeration and use of aerosols.
- HFCs have replaced the CFCs which used to destroy the ozone layer.

Value in tons equivalent CO<sub>2</sub> in 2005



# HFC A FEW SOLUTIONS

## FAVOURING NATURAL INSULATING MATERIALS

- Hemp wool
- Cork...



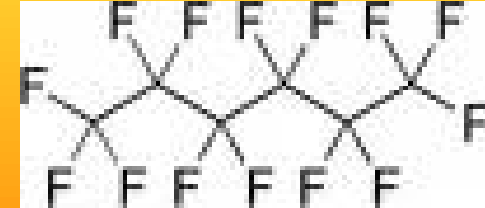
## AVOIDING AIR CONDITIONING

- Building bioclimatic buildings (the overhang of the roof protects the house from the summer sun).



# PERFLUORO-CARBONS (PFC)

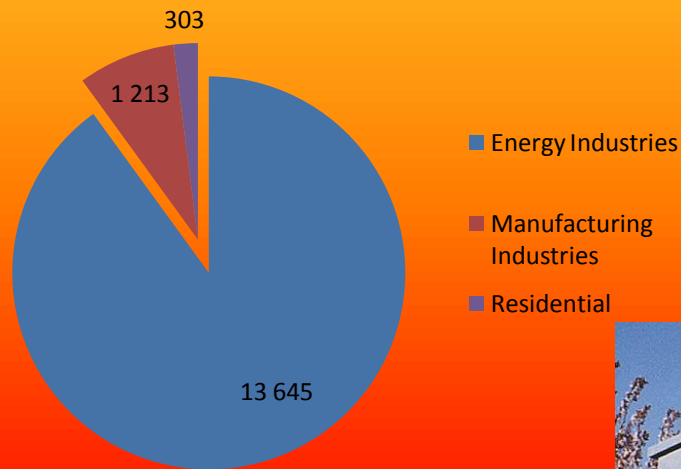
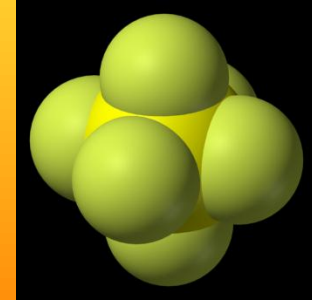
These are fluorine gases composed of carbon and fluorine atoms.  
Their life expectancy in the atmosphere varies from 2 600 to 50 000 years.  
Global Warming Potential GWP = from 6 500 to 9 200 depending on the molecules.



- There are no PFC emissions in our region.
- In France PFC emissions account for 0.3% of the greenhouse gases due to the aluminium industry.
- These emissions decreased by 60% between 1990 and 2006, dropping from 587 tons to 243 tons.

# SULFUR HEXAFLUORIDE (SF<sub>6</sub>)

This molecule is composed of 1 sulphur atom and 6 fluoride atoms.  
Its life expectancy in the atmosphere is 50 000 years.  
Global Warming Potential GWP = 23 900



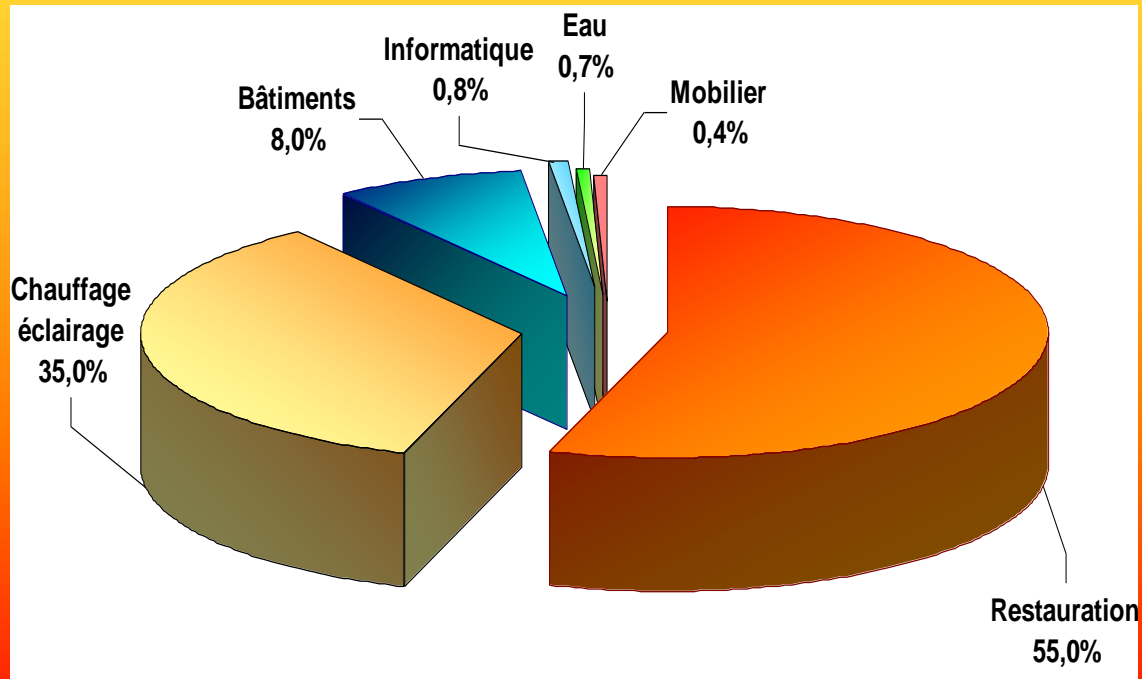
Value in tons equivalent CO<sub>2</sub>  
in 2005



- SF<sub>6</sub> emissions in our region are very rare, but are due to its use in electrical equipment (high voltage circuit breakers).
- Emissions decreased by 19% between 1990 and 2005 due to a better upkeep of this type of electrical equipment.

# AND OUR SCHOOL ?

Emissions of greenhouse gases in all the schools in the Deux-Sèvres area.



- According to a local government study, the school canteens, their heating and lighting systems emit the most greenhouse gases.
- Our next mission, is to suggest changes that would allow reductions in the emission of greenhouse gases.

# Documentary sources

- Bilan des émissions de GES en Poitou-Charentes 1990-2005 (Observatoire régional de l'énergie et des GES – octobre 2008).
- Inventaire des émissions de GES en France au titre de la convention cadre des nations unies sur les changements climatiques (Centre interprofessionnel technique d'études de la pollution atmosphérique – décembre 2007).
- <http://www.manicore.com/index.html>
- <http://fr.wikipedia.org/>