THE GREENHOUSE GASES
GLOBAL WARMING

Sun

Earth

Atmosphere
• The sun heats the Earth.
• The Earth loses heat in the form of infrared rays
• Some of this heat is blocked by greenhouse gases, maintaining an average temperature of 15°C.
• Unfortunately, there are more and more greenhouse gases in the atmosphere because of human activities.
A rise in temperature of 0.9°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.
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

- A rise of 3% between 1990 and 2005.
- The predominant gas is CO$_2$ (66%), followed by nitrous oxide (21%) and methane (11%).
The dioxide molecule is composed of 2 oxygen atoms and 1 carbon atom. Its life expectancy in the atmosphere is a 100 years.

- Most CO$_2$ 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.
Cars have been running on petrol for more than a century. A small car emits on average 195 g of CO₂ per km.

**Favour:**
- Walking and cycling for short journeys (0 g of CO₂ per km).
- Sharing car journeys.
- Using public transport (8 g of CO₂ per km for the train).

Avoid travelling by plane (220 g of CO₂ per km per person).

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 €.
CO$_2$ 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$_2$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

- 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$_2$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$_4$)

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

- 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).

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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 CO₂ in 2005.
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).
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$_6$)

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

- SF$_6$ 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.

Value in tons equivalent CO$_2$ in 2005

- Energy Industries: 13 645 tons
- Manufacturing Industries: 1 213 tons
- Residential: 303 tons
AND OUR SCHOOL?

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

- According to a local government study, the school cantines, 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


- 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).
