Costs of climate change and how to reach « factor 4 » reduction

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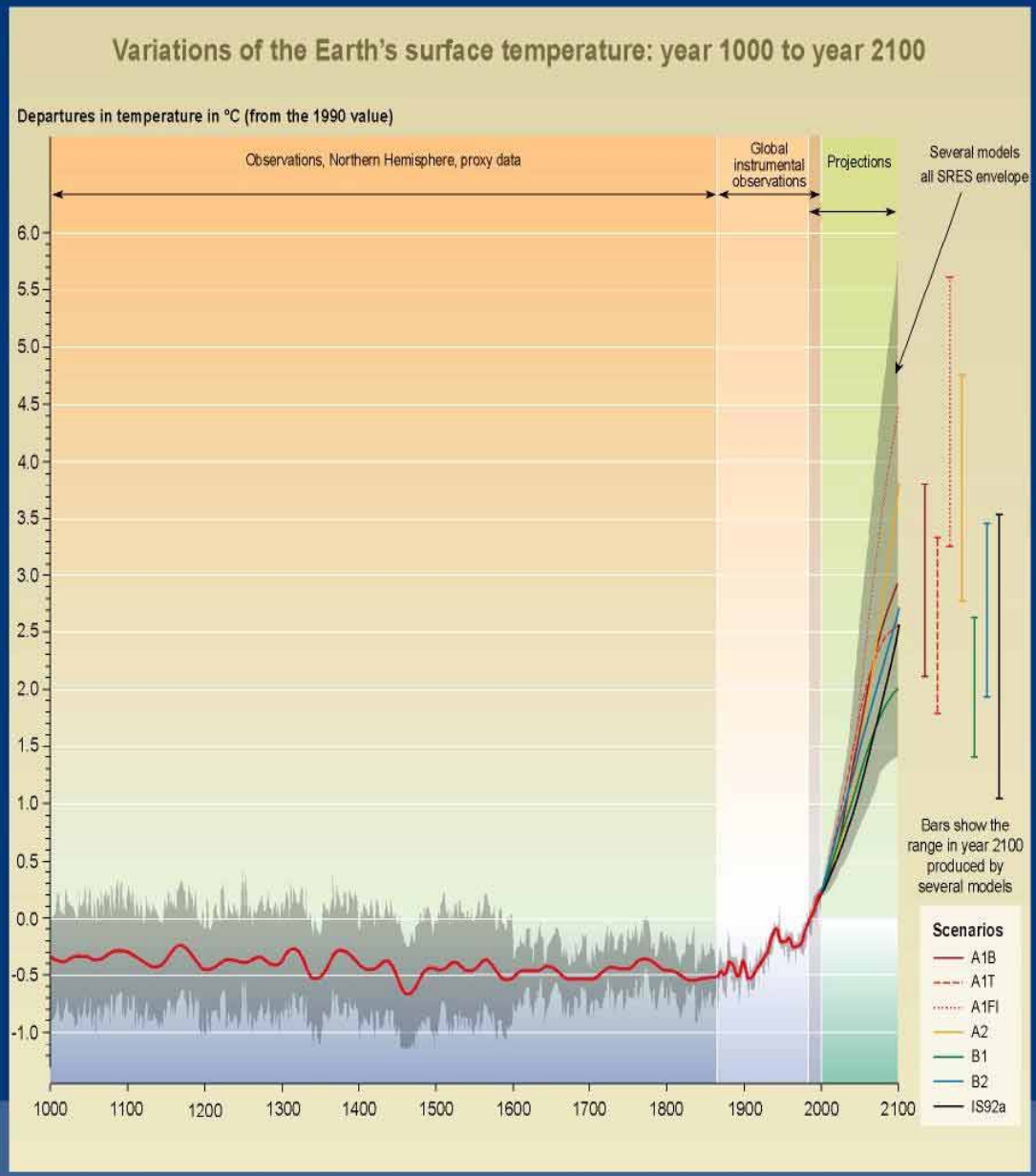
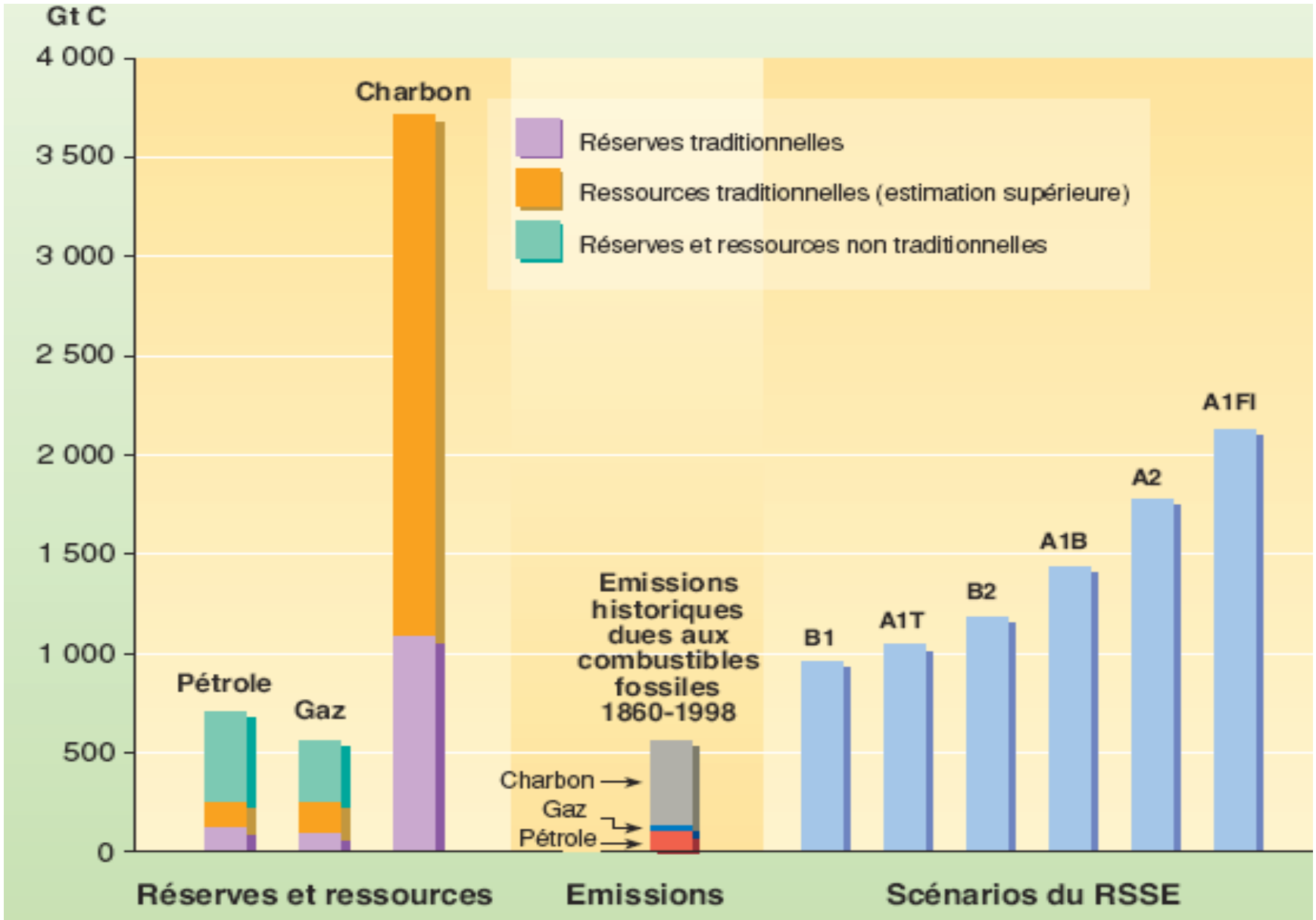
- **1) Climate change can induce consequences whose strength and duration, even in the best case, are hitherto unknown by our societies, and probably humanity.**



SYR - FIGURE 9-1b

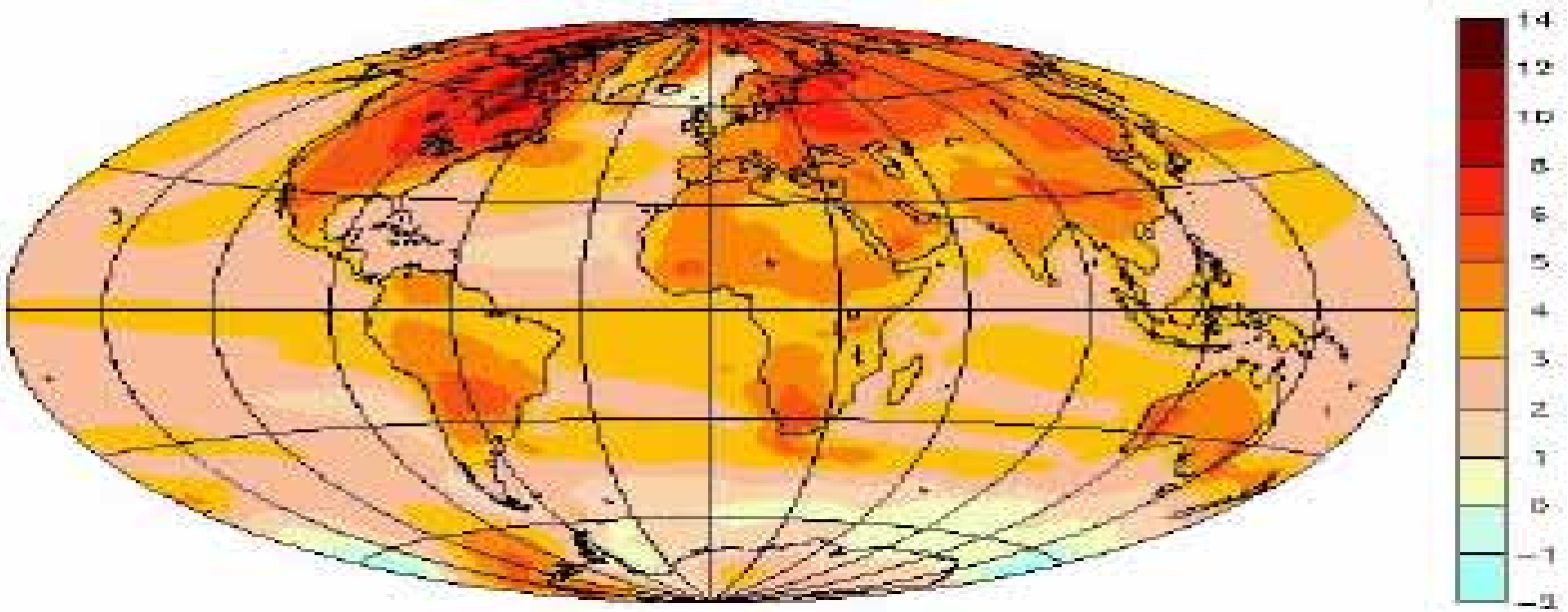
- **Fossil fuel shortages will not solve the problem.**

Fossil fuels shortage won't save the climate



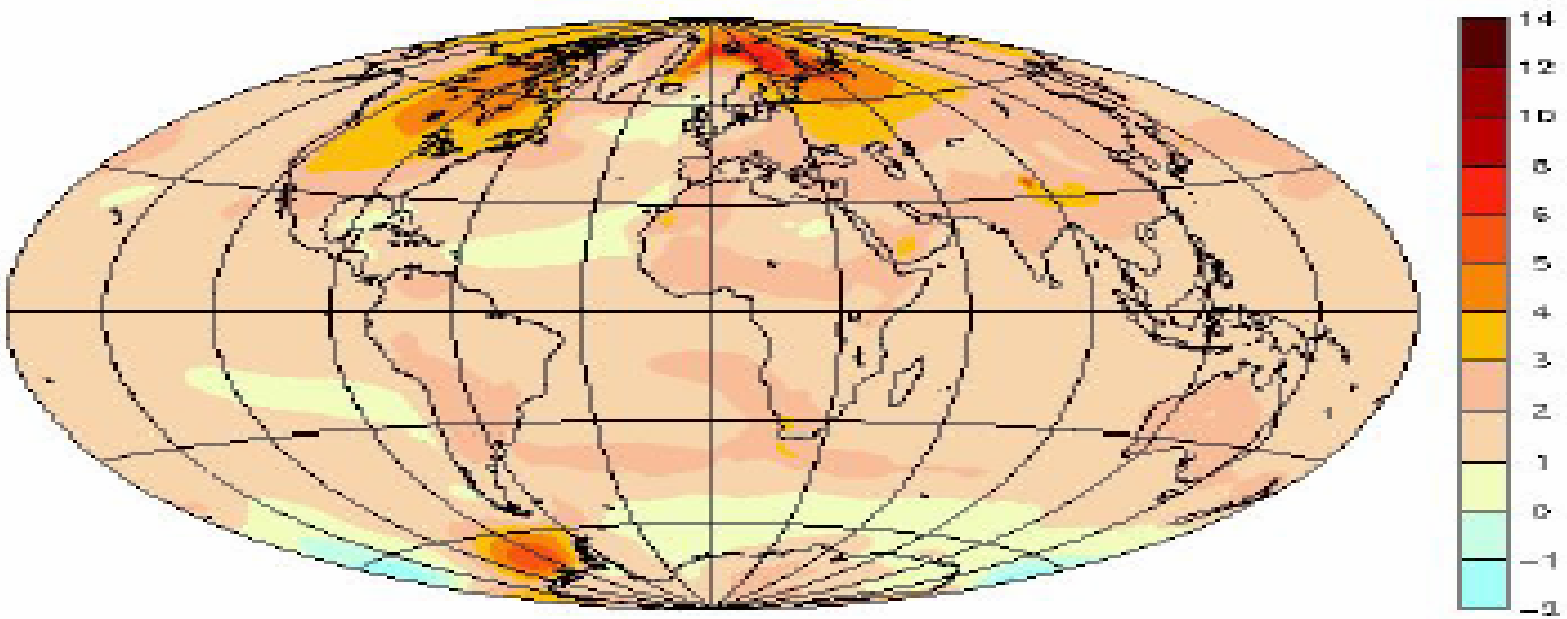
- 3) **There are tremendous differences between +2°C and +4°C or more. The heaviest carbon scenarios, derived from BAU policies, would likely be not viable for humanity.**

Réchauffement fin XXI° sous A2 (IPSL - 2005)



IPCC / IPSL — SRESA2 scenario — Anomalies de la temperature (deg C)
(2090−2099) comparee a (2000−2009)

Réchauffement fin XXI° sous B1 (IPSL 2005)



IPCC / IPSL – SRESB1 scenario – Anomalies de la temperature (deg C)
(2090–2099) comparee a (2000–2009)

Conclusion: ways out are existing yet, but to be started immediately

- « *Between plus 2°C (450ppmCO2) and plus 4°C (650ppmCO2), violence of impacts will be tremendously different* » Jean Jouzel, IPCC, juin 2005
- « Current models suggest that *stabilizing carbon dioxide levels at around 550 ppm by 2100 could reduce flooding frequency by some 80 to 90% along the most vulnerable parts of the Indian and Bangladesh coastlines*, as compared with a scenario of continuing growth in consumption of fossil fuels » David King, Chief Scientific Adviser to H.M. Gov., january 2004
- « *We have only a few years to do something, not ten years: far less* » : Peter van Geel, Environment minister of Netherlands, july 2005

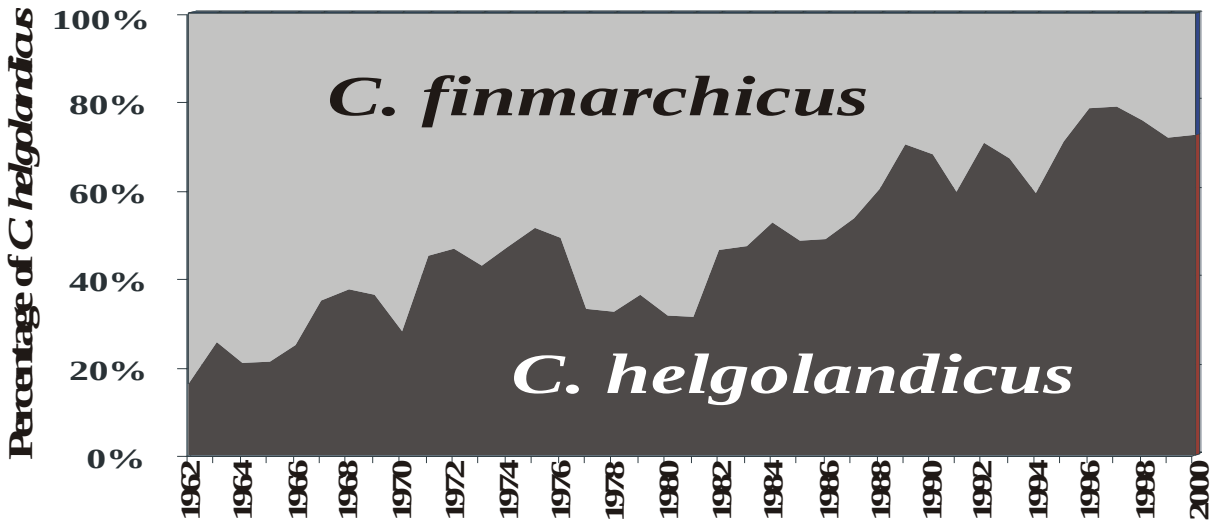
- **4) Observations confirm reality of climate change and illustrate some future impacts and costs**

Facts

- 280ppm in 1750, 380ppm en 2005, more than in the last 10My. Twice more carbon emitted than Earth can capture.
- XX° century, exceptionnal warming : +0,6°C (2,5W/m2), +2°C on Arctic region.
- Antarctic :+3,5°C depuis 1945 ; important collapses (ex: 3250km2 in 2002)
- Arctic: -40% iceshell since 1960
- 80% of the world glaciers and permafrost melt : -8cm/y in Siberia, and +1,6 to 3,3°C in Alaska since 1980
- Ocean warming (+1°C around NZ in 100 years) : absorption reduced
- Ocean level : 1,5 to 2mm/y during the XX°c, 3 today
- Biodiversity threatened by rapid change. Ex France: +0,9°C in one century = shifting of meteo conditions150m higher or 180km northward. Consequences observed on fauna, flora, agriculture, fish…
- Increase of climatic damages.
- 2025: 75% population in a 60km distance from coastlines

past trends

- Northward shift of zooplankton species by up to 1 000 km and major reorganisation of plankton ecosystems over last 30 years
- Increase of presence and number of sub-tropical species in the North Sea over the last decade



future projection

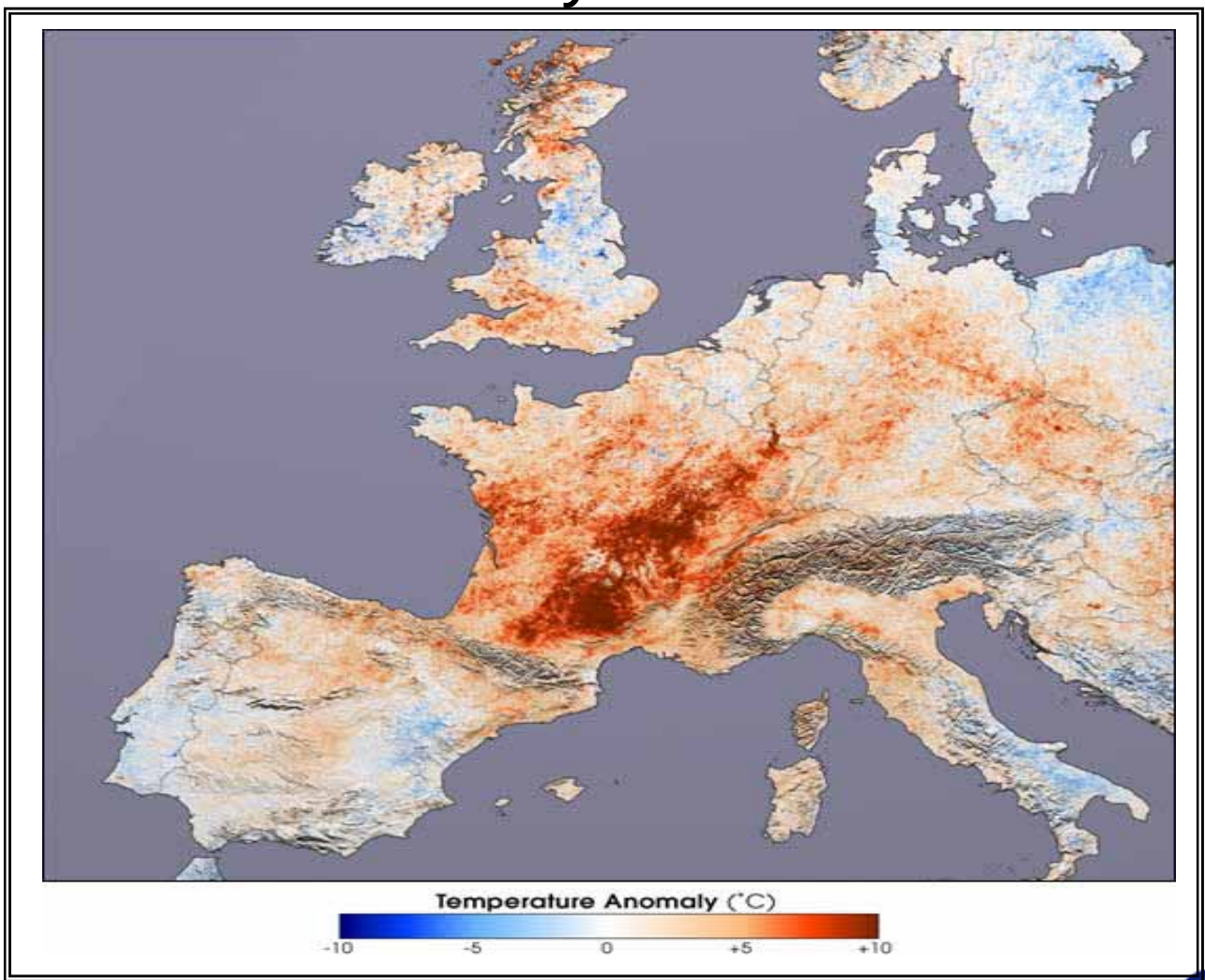
- Further northward shift

Data-sources: SAHFOS (CPR), …

2003 summer in Europe: thermical anomaly

July 2003/
July 2002

MODIS data



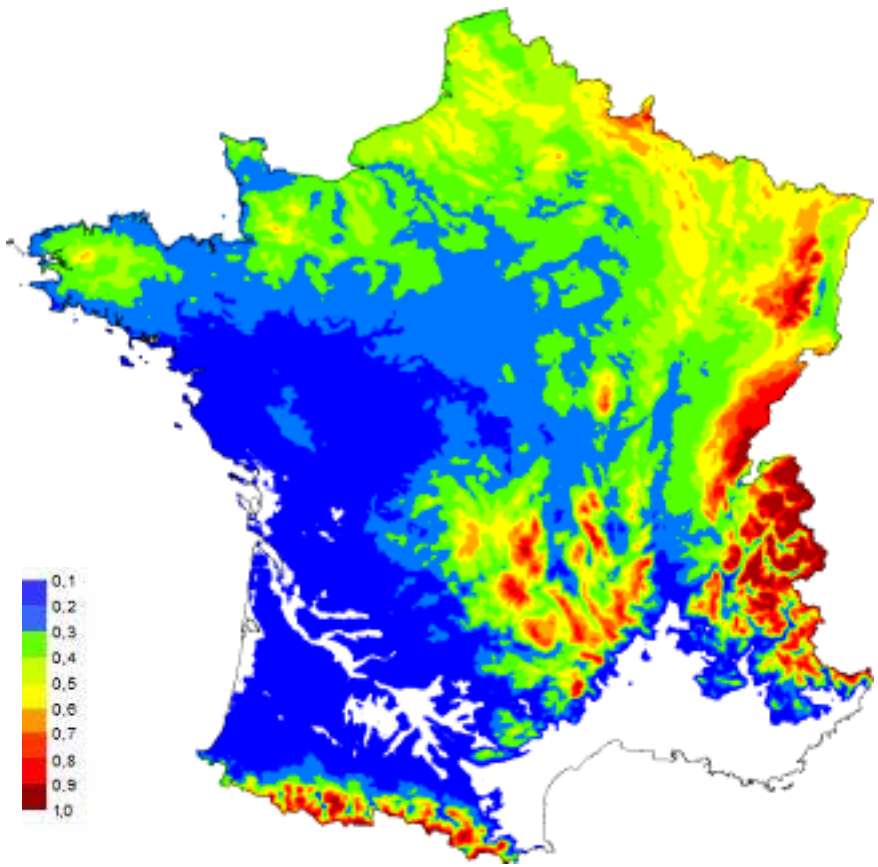
VISIBLE EARTH
a new collection of earth imagery

earth observatory

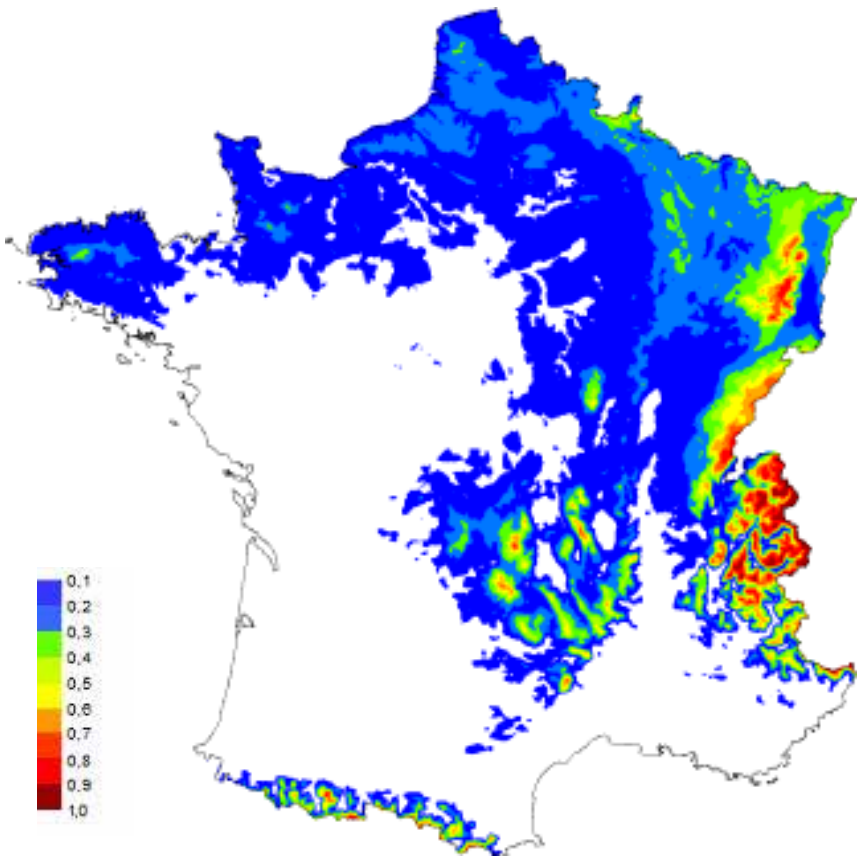
Example of ecosystemic migration: conditions for beech in France

Source : Carbofor Badeau *et al*., 2005

2005



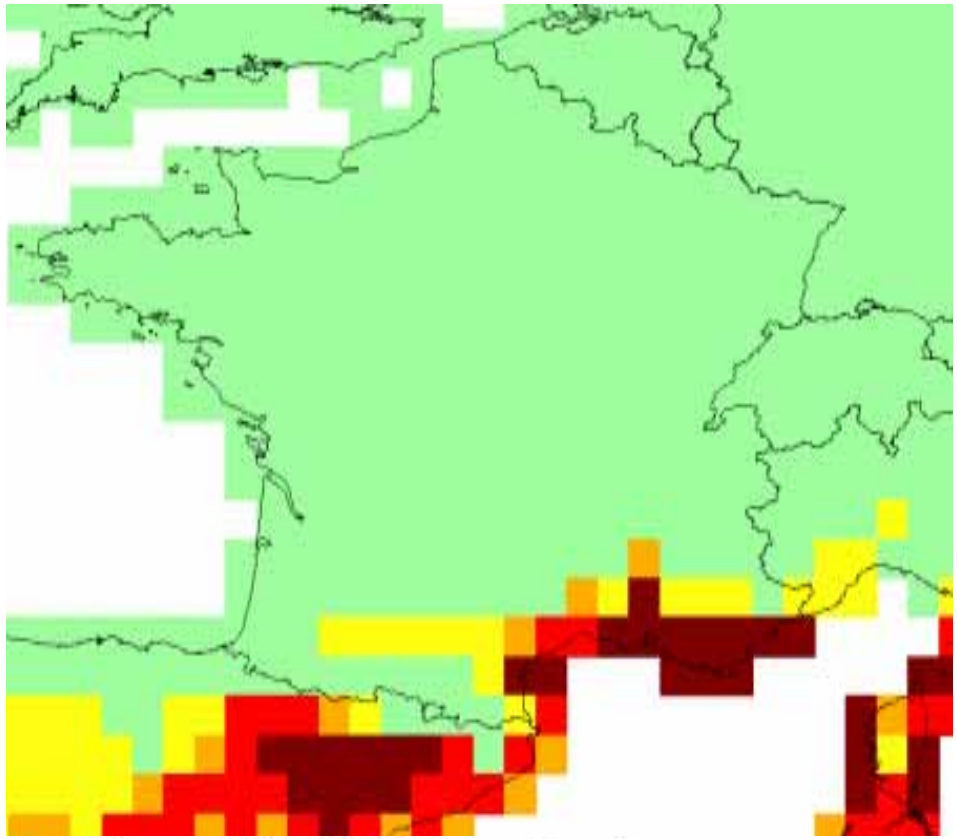
2100



- **5) Costs and shocks for agriculture, tourism, fisheries, forestry, ecosystems, but also for most networks and human settlements, and likely for global security.**

Fire risk, normal situation (13 08 2004)

Calcul de l'Indice Forêt Météorologique par le « JRC »



Fire risk, situation on 13 08 2003

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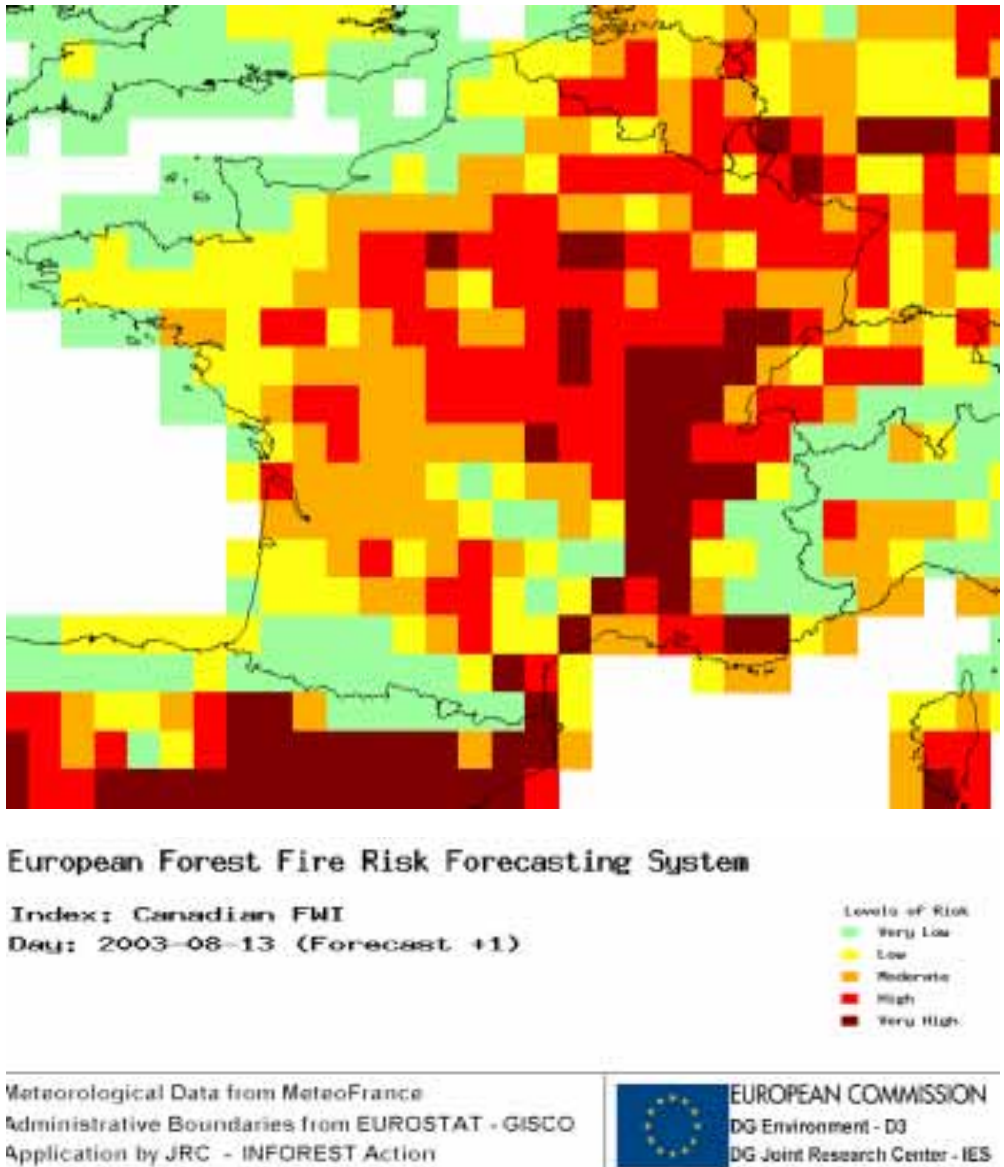
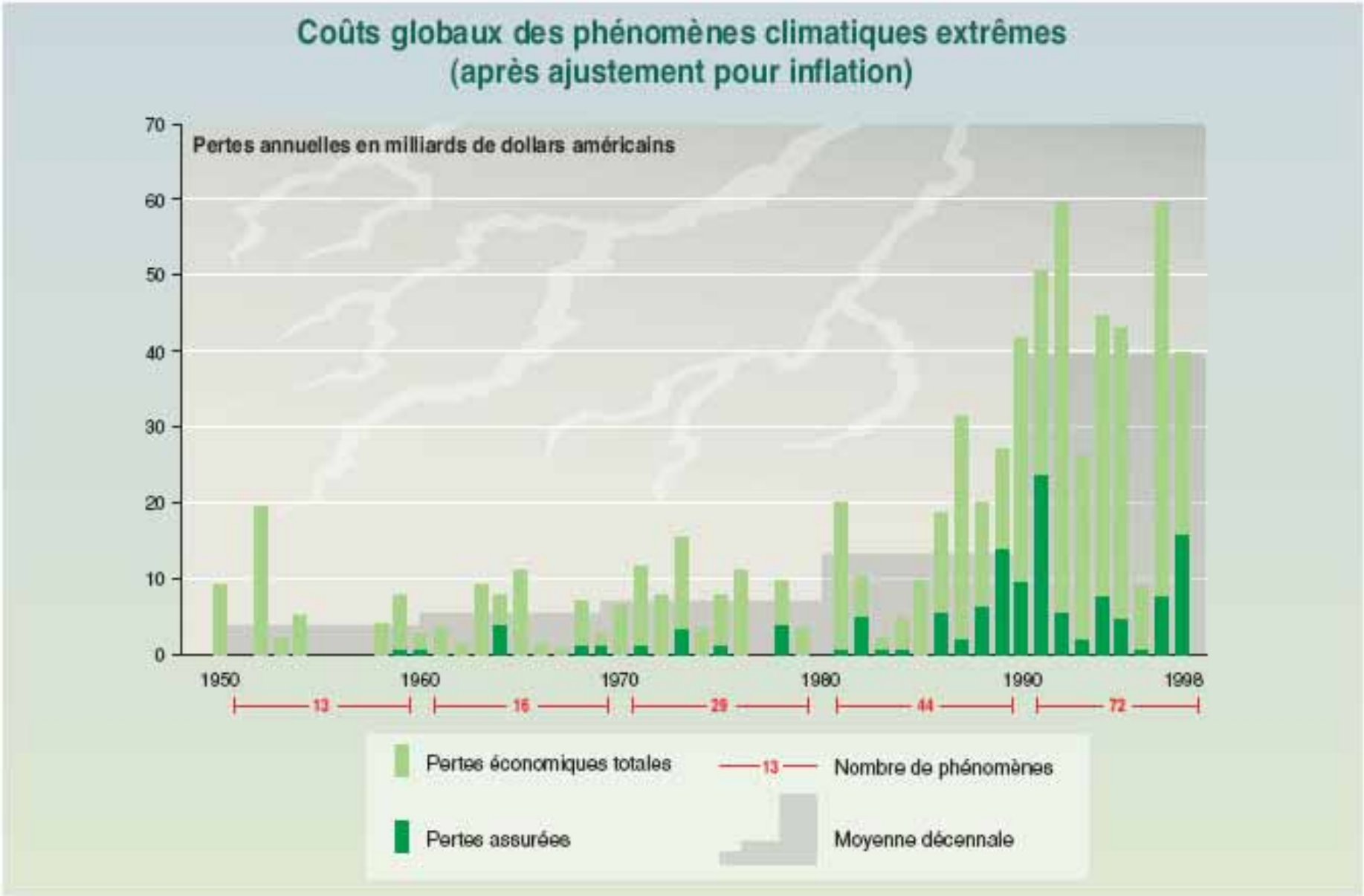


Climatic extreme events: insurers don’t pay everything…

source Swiss Ré



Damages are more expensive than prevention

- «An extensive review by the IPCC suggests that **stabilizing atmospheric carbon dioxide at 550 ppm would lead to an average GDP loss for developed countries by 2050 of only around 1%.**
- This figure should be more than offset by the reduction from the risks, for example, of flooding associated with climate change. For instance, **if just one flood broke through the Thames Barrier today, it would cost about £30 billion in damage to London, roughly 2% of the current U.K. gross domestic product** (GDP)…"

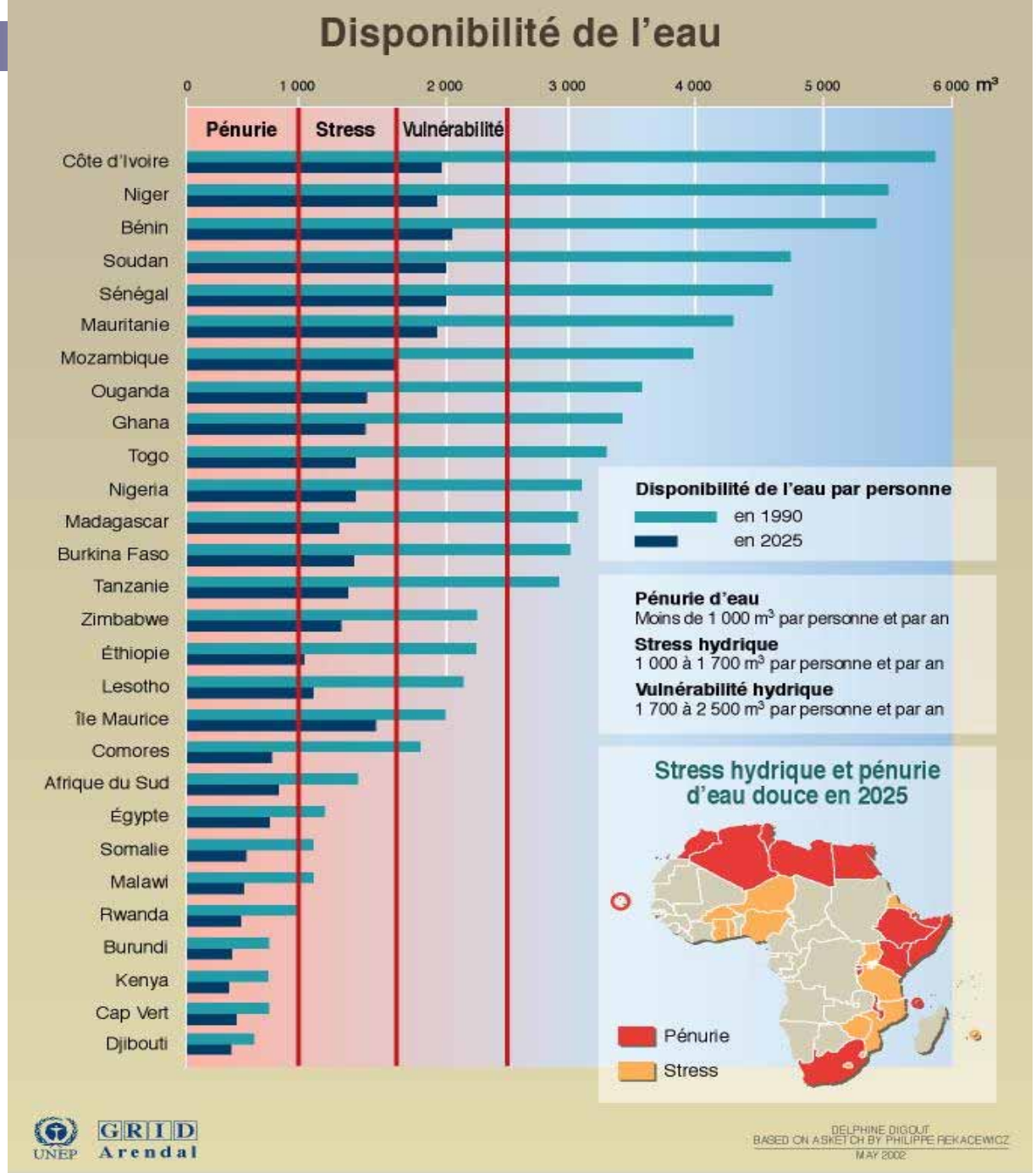
David King, Chief scientific adviser to HM Gov., Science 080104

- **« 1910 » in Paris**: 70cm higher; will concern 880000 persons and 170000 societies (metro-RER, electricity, drinkable water, phone…): **€30 billion in damage.**

Commissariat Général du Plan, 2005

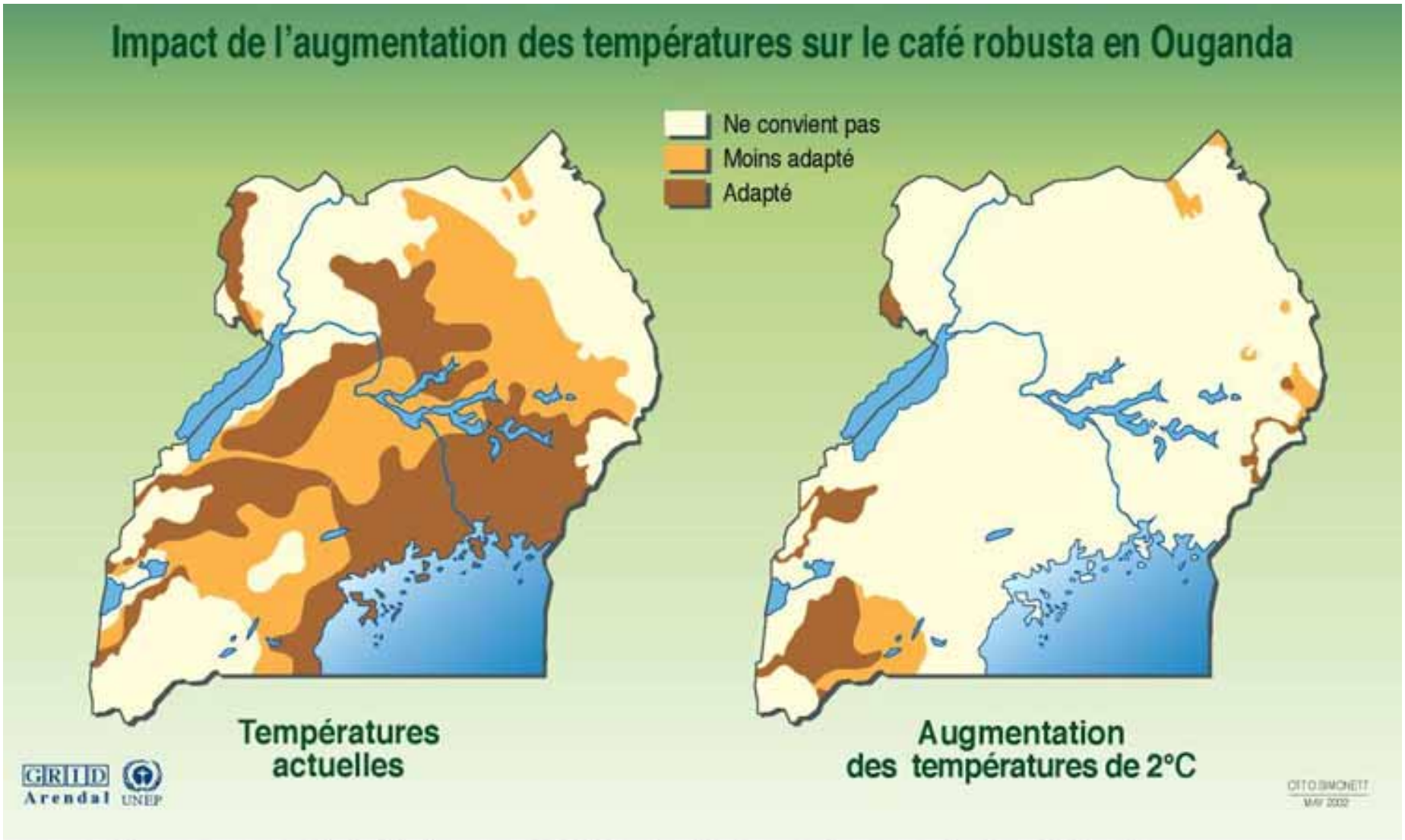
- **Katrina 2005: $125 billion? – a lot more than restauration of dams and marshes (some tenths of $M)**

Africa:
minus water
and
more heat
in 2025 already



Source : Commission économique des Nations unies pour l'Afrique (UNECA), Addis Abeba, Avenir de l'environnement mondial 2000 (AEM), PNUE, Earthscan, Londres, 1999

Agriculture: even with 2°C, major changes expected



Source : Otto Simonett, Impacts potentiels du réchauffement mondial, GRID-Genève, étude de cas des changements climatiques, Genève, 1989

Source : GIEC / GRID

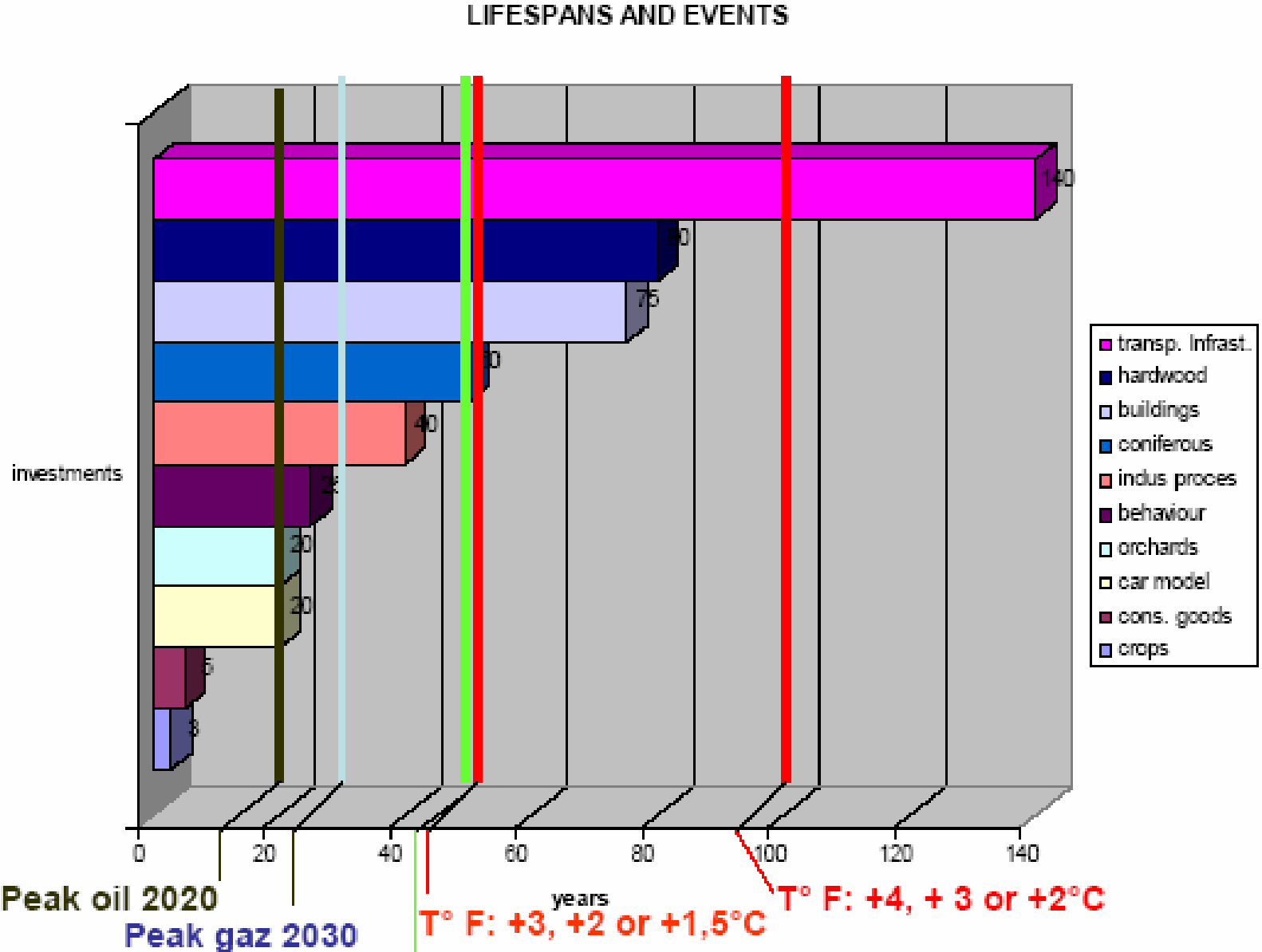
- **6) How to reach only 2°C (450ppm CO2) … and stay there?**

We can’t wait for « technological miracle for tomorrow »

- Technological inertia: discovery, assessment, achievement, spreading, generalization…
- Weight of decided investments: finances (loaning capacity), lifetime, induced behaviour
- Several likely challenges coming shortly
- Only 20, perhaps 10, years to shift development models towards climate viability

…your investment will have to face…

If you decide to invest in 2005 in …



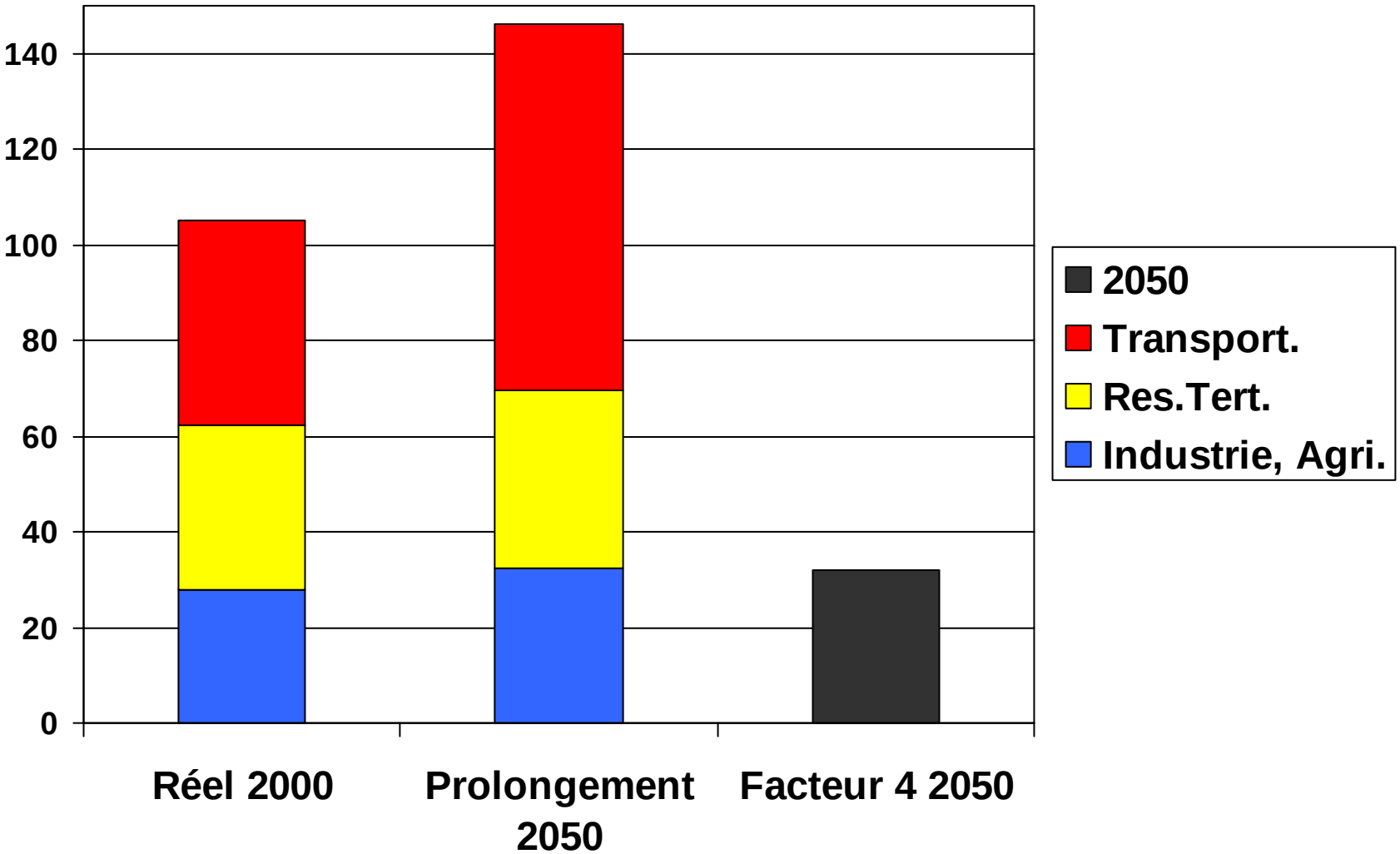
Fact. 1, 2 or 4

D. Dron - EMP - août 2005 - after IPCC+IPSL

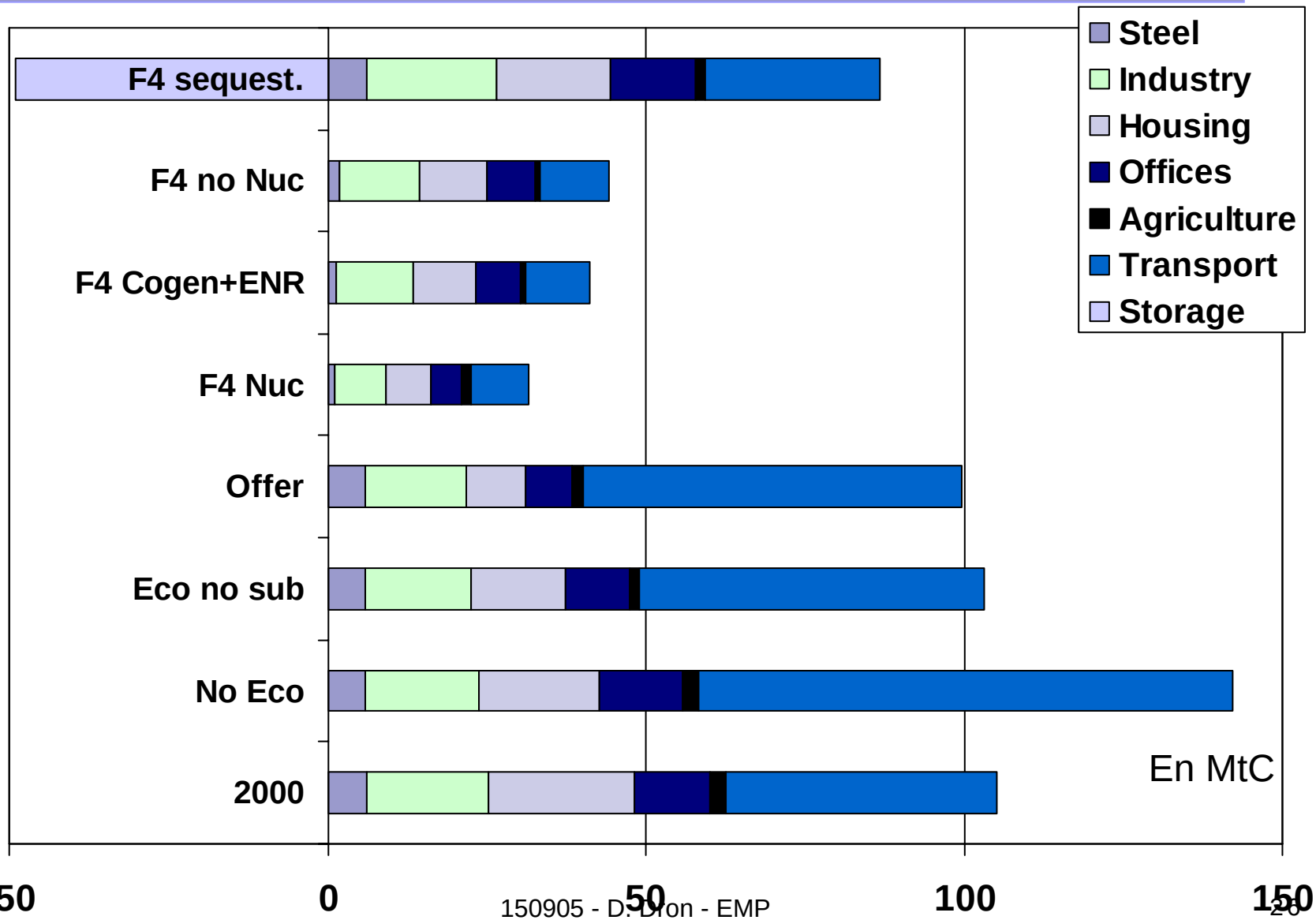
What would « Factor 4 » mean for France

En MtC

(MIES, 2003, P. Radanne)



CO2 emissions (MIES 2003, P. Radanne)



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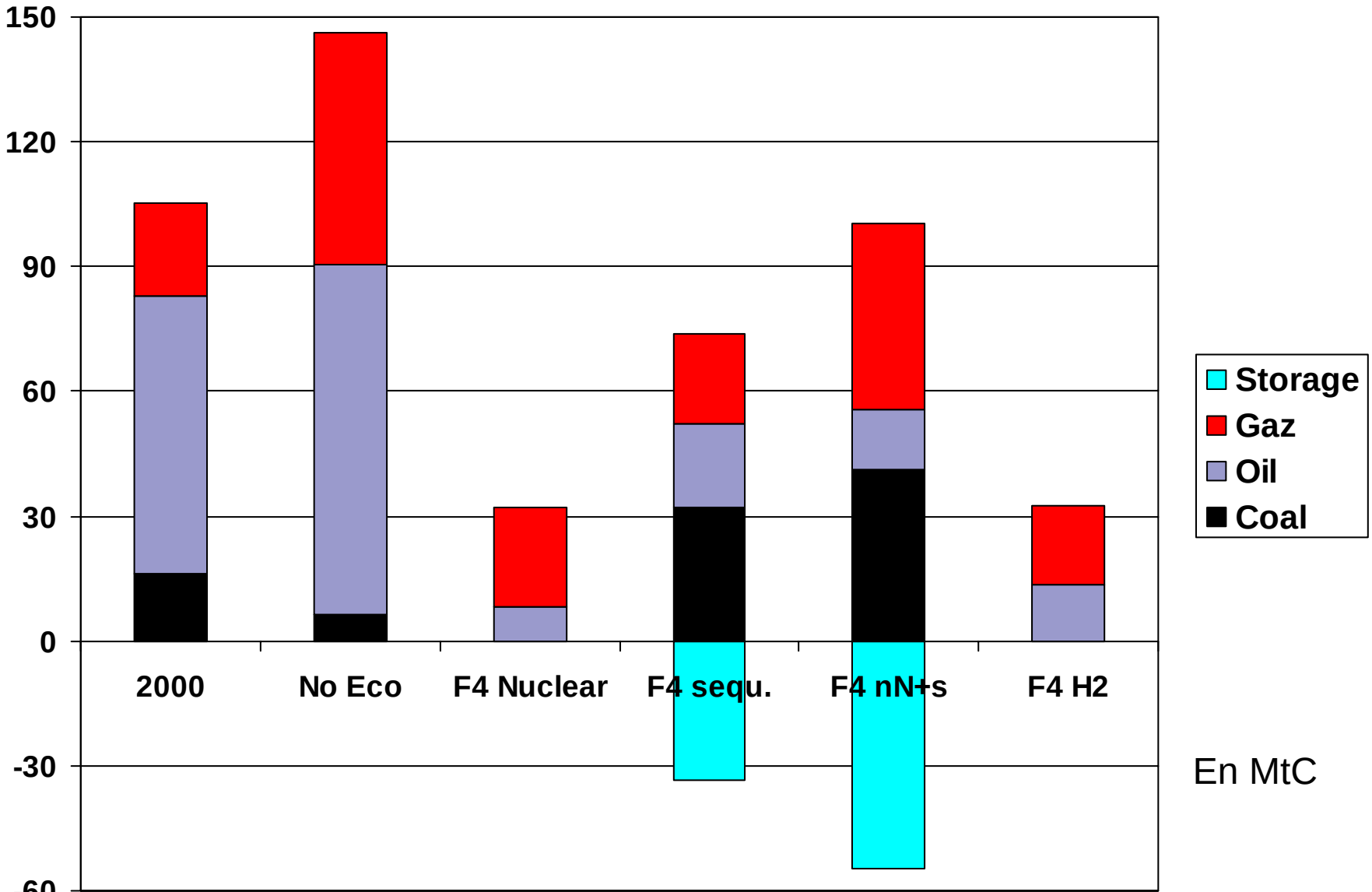


What is absolutely necessary

(source MIES 2003)

- Transports depending only on fossil fuels for one third and 3 to 4 times more efficient
- Buildings without fueloil, 3 times more efficient
- Electricity production not based on fossil fuels (except safe sequestration capacities)
- General energy efficiency of goods and services maximized !
- Renewables diversified
- Daily efficiency sustained by education and electronics

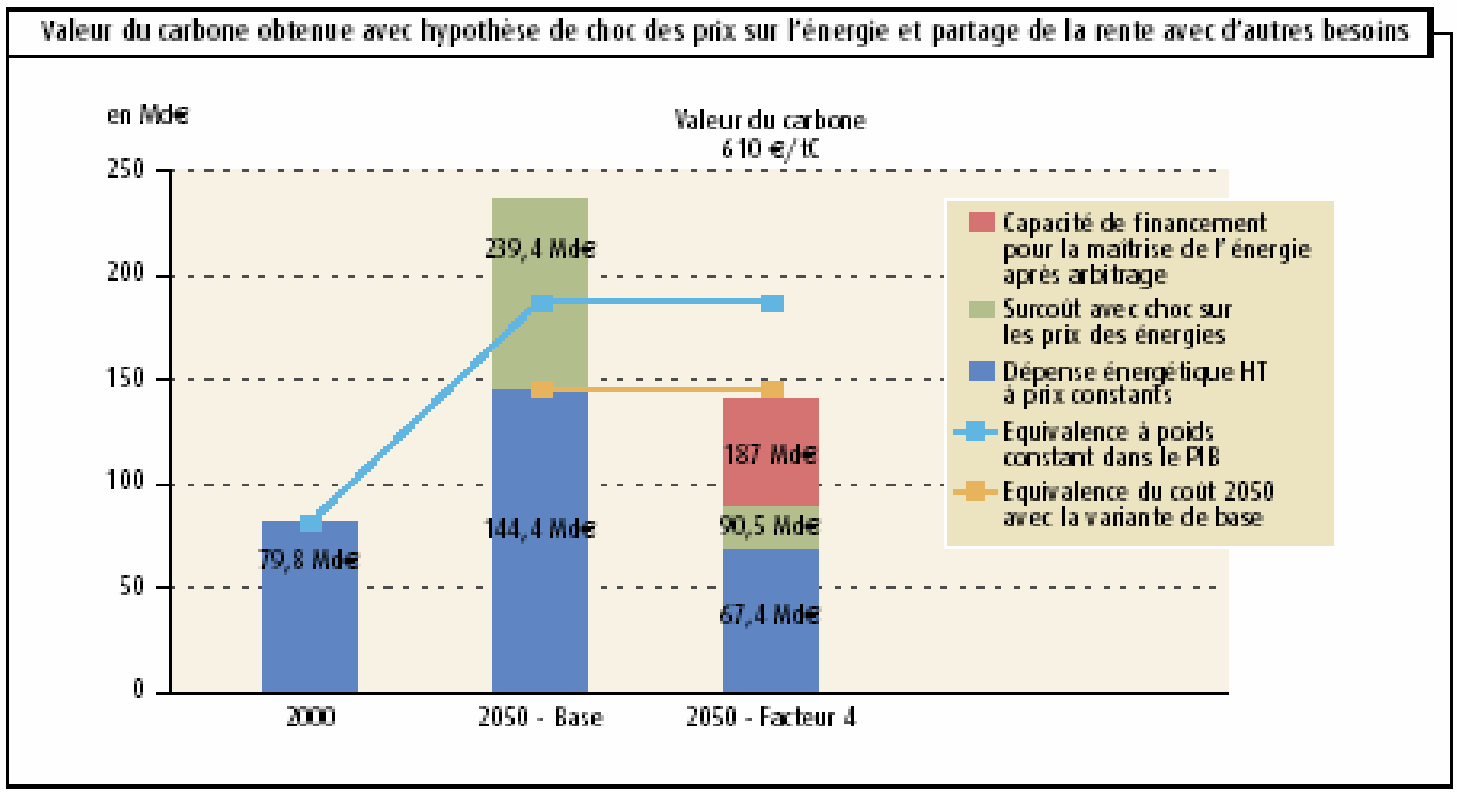
Some questions for 15 years to achieve results in 30 years (source MIES 2003)

- Séquestration of CO2? The latitude for fossil fuels
- Electricity storage? The latitude for intermittent energies and for transports
- H2 storage and distribution? Faisability of vector H2 diffusion
- Robustness of institutions and societies? To manage our present transition period of 20 or 30 years

Is « 450ppm CO2 » expensive?

- Less than adaptation to other scenarios!
- E. Morley, UK State secretary for Environment, 2004: «*minus 60% GHG in 2050 would cost 6 months late for growth in 2050* »
- 450ppm for the world (from 12 economic models of IPCC): «*at most 4% cumulated GDP in 2050, that is minus 0,069% annually, excluding ancillary benefits* » (CIRED, 2002)
- Ancillary benefits: avoided damages (pests, droughts, heat waves, cyclones, high tides, floods, agricultural threats, air pollution, quicker fossil fuel depletion…) and conflicts.

Containing the climate threat is economically beneficial (MIES, 2003)



The challenge « number one » ?

- Climate is not the only problem humanity faces today, but the other problems would be more difficult to treat if this one was not effectively dealt with.
- The question is not to compare 450ppm scenarios with dreamt BAU scenarios ignoring climate damages, but 450ppm scenarios to 650, 800 or more ones.
- Humanity would be exposed to more poverty and violence in upper CO2 scenarios than with 450ppm.
- Humanity will gain if we stay under +2°C, some actors will have to convert.
- Everybody will have to adapt even with « only » +2°C.
- **Never has humanity met such a big common challenge,**
- **and never has it shared so much knowledge to succeed,**
- **if it is to start now in an equitable and reasonable way.**