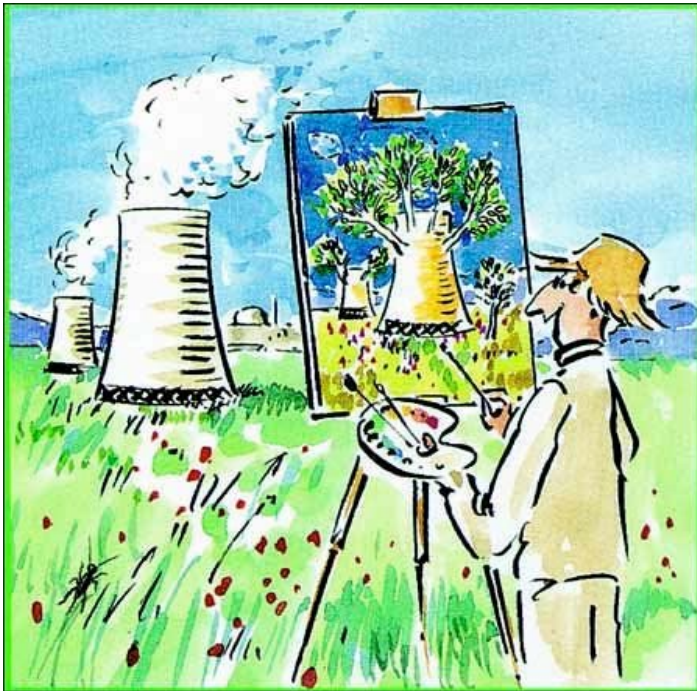




The environmental case for nuclear energy



Brussels

17th October 2006

by Bruno Comby
Independent scientist,
Director of the Comby institute
and President of EFN-INTERNATIONAL
(Environmentalists For Nuclear Energy)



EFN



Introduction

The life of an environmentalist

Energy and the environment

Information on energy

Climate change

What can we do?

Energy conservation

Renewable energies

Nuclear energy

Nuclear waste and reprocessing

Radioactivity in nature

Energy dependence

Risks and accidents

EFN - Conclusion



EFN

Why an environmentalist is in favor of nuclear energy ?





The life of an environmentalist - childhood in nature

EFN



France



Gabon



United States



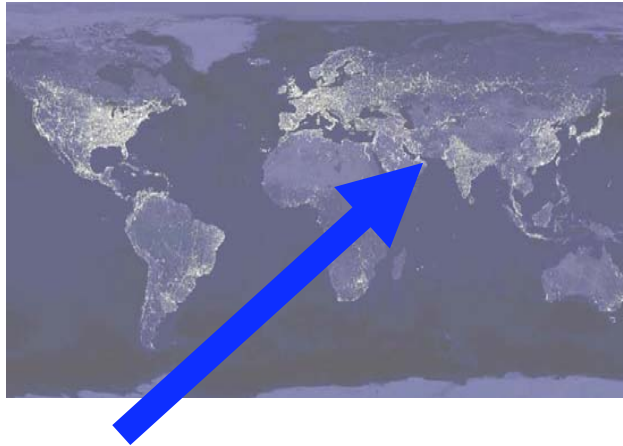
Canada ...





EFN

The life of an independent scientist - Military service



War zone :
Persian Gulf
Hormuz strait

Problem :
Safety of oil tankers



EFN

Bruno Comby - The life of an Environmentalist



Photo rights reserved

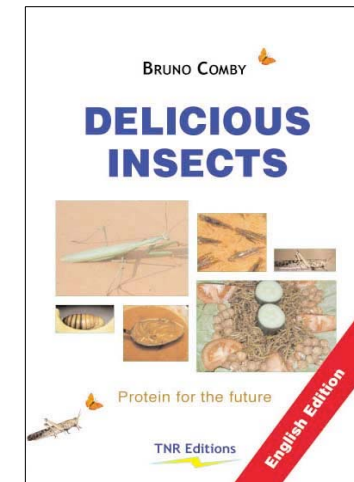
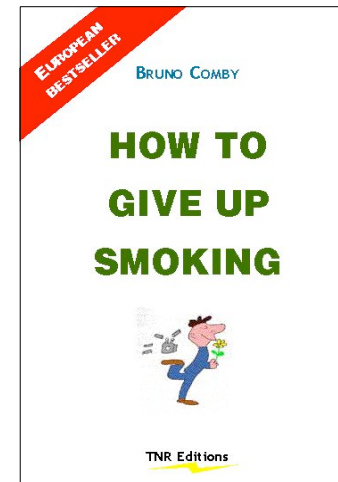
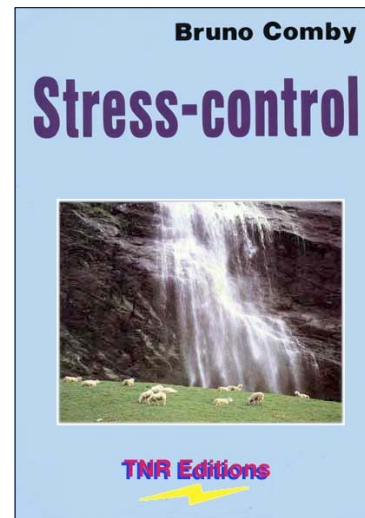
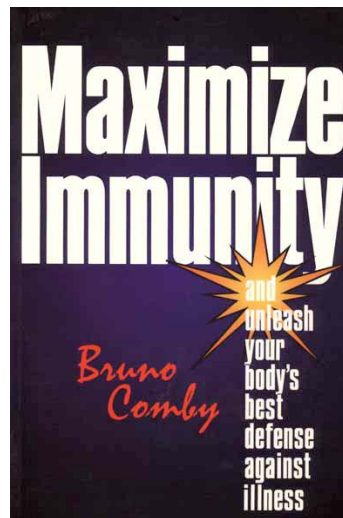
25 years dedicated to pioneer work in fundamental research, publications, and teaching the public about natural health and the protection of the environment.



The life of an environmentalist - research and books

25 years of pioneer research on healthy living and the protection of the environment

8 books published in 12 languages with over 1 million readers



More than 1500 TV and radio presentations and press articles
Popular lecturer around the world

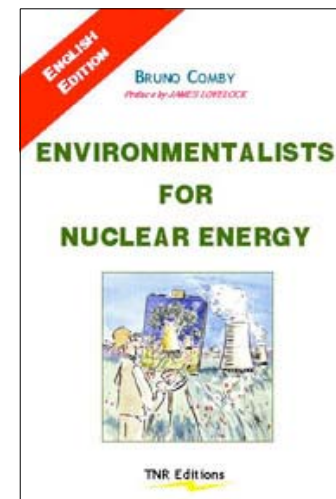


Photo of the world at night



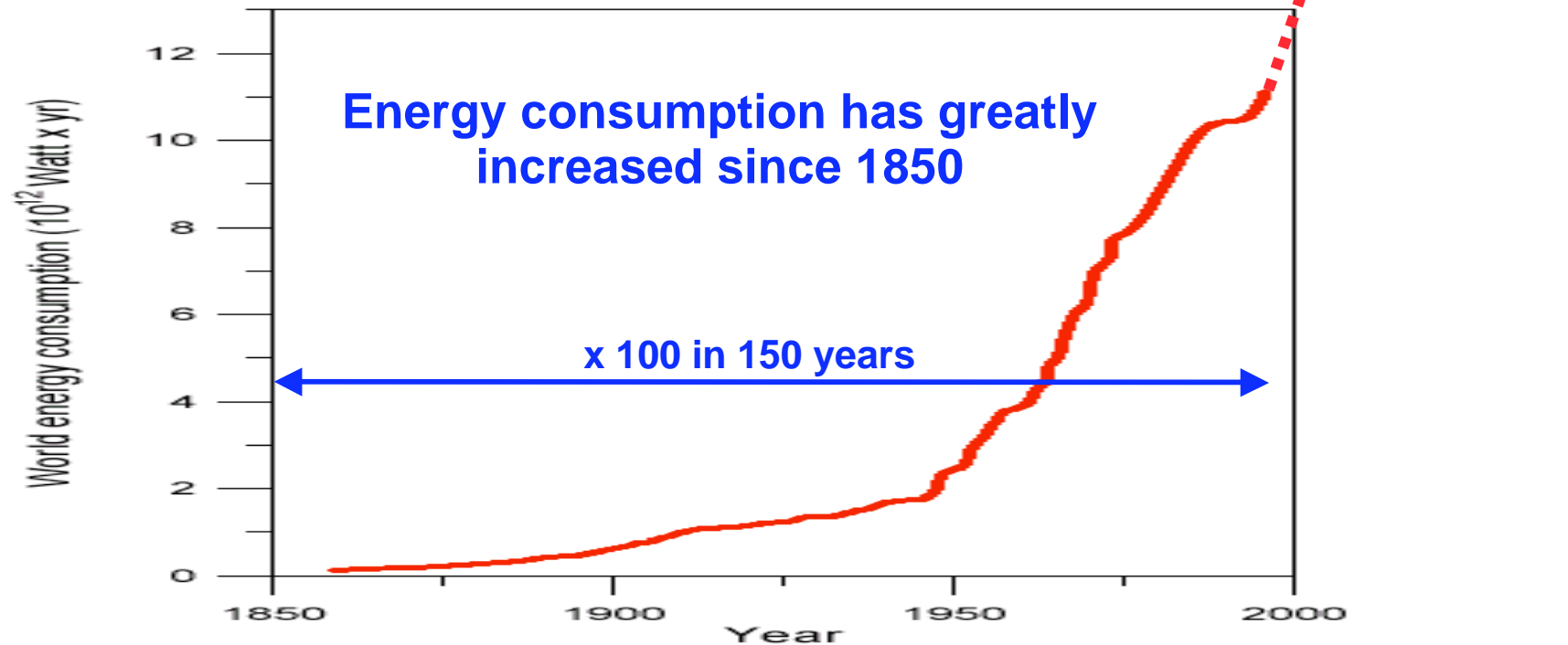
**Today, 20% of the world's population
consumes 60% of the energy**

Planet Earth seen at night from outer space (reconstructed image) - © Nasa 2000



EFN

World Energy Consumption since the Industrial Revolution



Today, energy consumption is increasing rapidly in developing countries, and moderately in industrial countries.



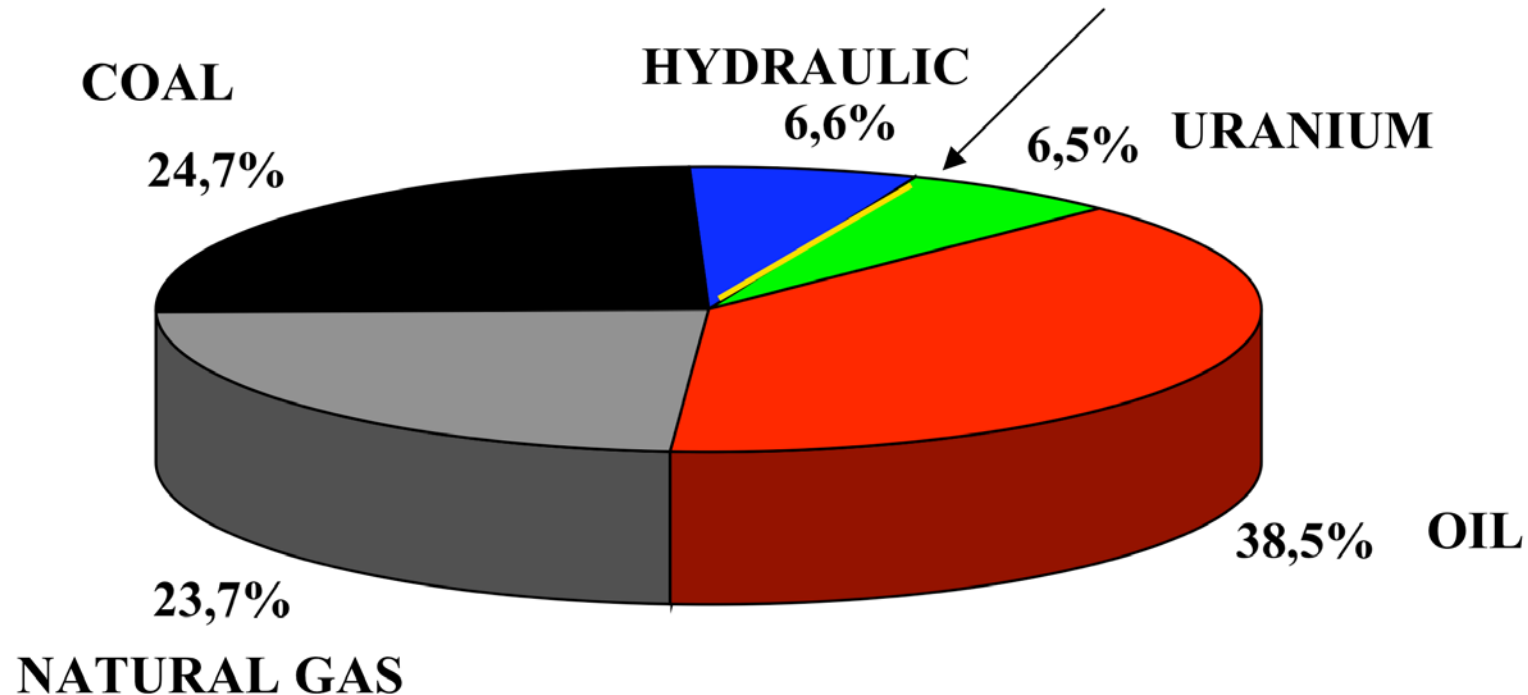
EFN

ENERGY SOURCES

excluding biomass - fire wood (world 2002)

87% of the energy is fossil (coal, oil, gas) and contributes to the greenhouse effect

Wind + geothermal + solar = less than 1%



9,1 Gtoe/yr + biomass \sim 10 Gtoe/yr

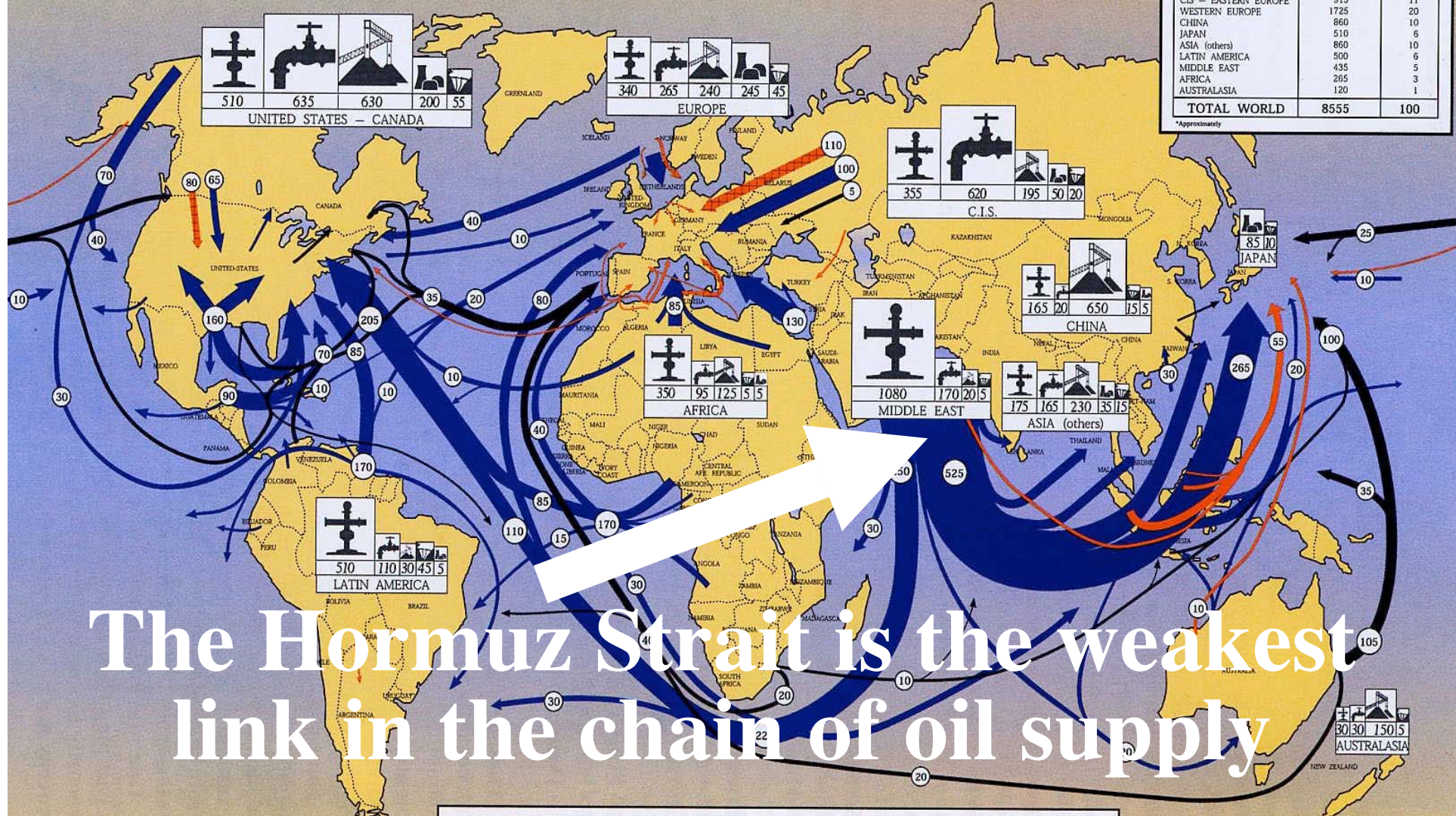
Source : BP 2002

ENERGY WORLDWIDE IN 1998

70% of the world's oil supply comes from the Middle East with all its geopolitical implications

PRIMARY ENERGY CONSUMPTION*		
Areas	Consumption (Million tonnes oil equivalent)	Share (%)
UNITED STATES – CANADA	2365	28
CIS – EASTERN EUROPE	915	11
WESTERN EUROPE	1725	20
CHINA	860	10
JAPAN	510	6
ASIA (others)	860	10
LATIN AMERICA	500	6
MIDDLE EAST	435	5
AFRICA	285	3
AUSTRALASIA	120	1
TOTAL WORLD	8555	100

*Approximately

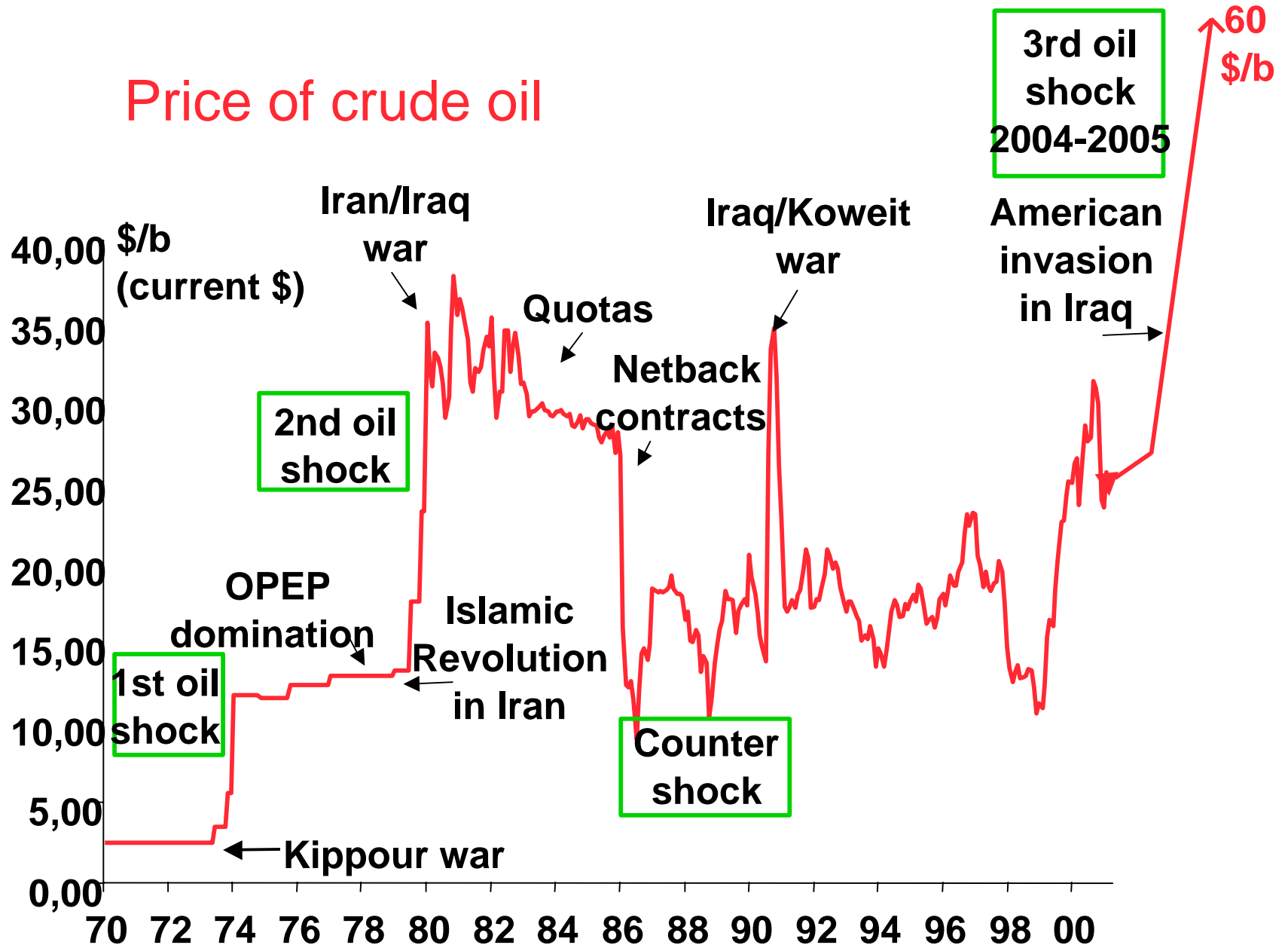


The Hormuz Strait is the weakest link in the chain of oil supply



EFN

Price of crude oil



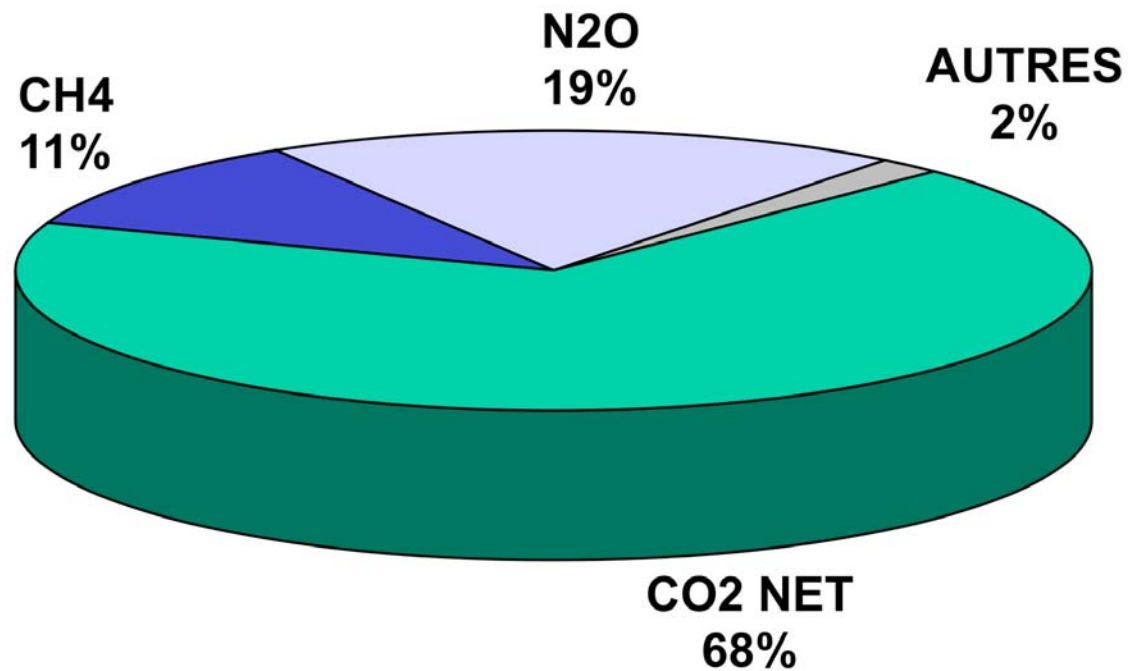
Source : Platt's

IFP



EFN

CONTRIBUTION TO GLOBAL WARMING*



* Share in the increase of
the greenhouse gas effect

Ref: GIEC 1995-X Environment
Figures for France

GreenHouse Gas Effect

20th century : +0.5 to 1°C

21st century : +3 to 10° C

Let 's suppose... : we stop emitting greenhouse gases today, what happens with global warming ?

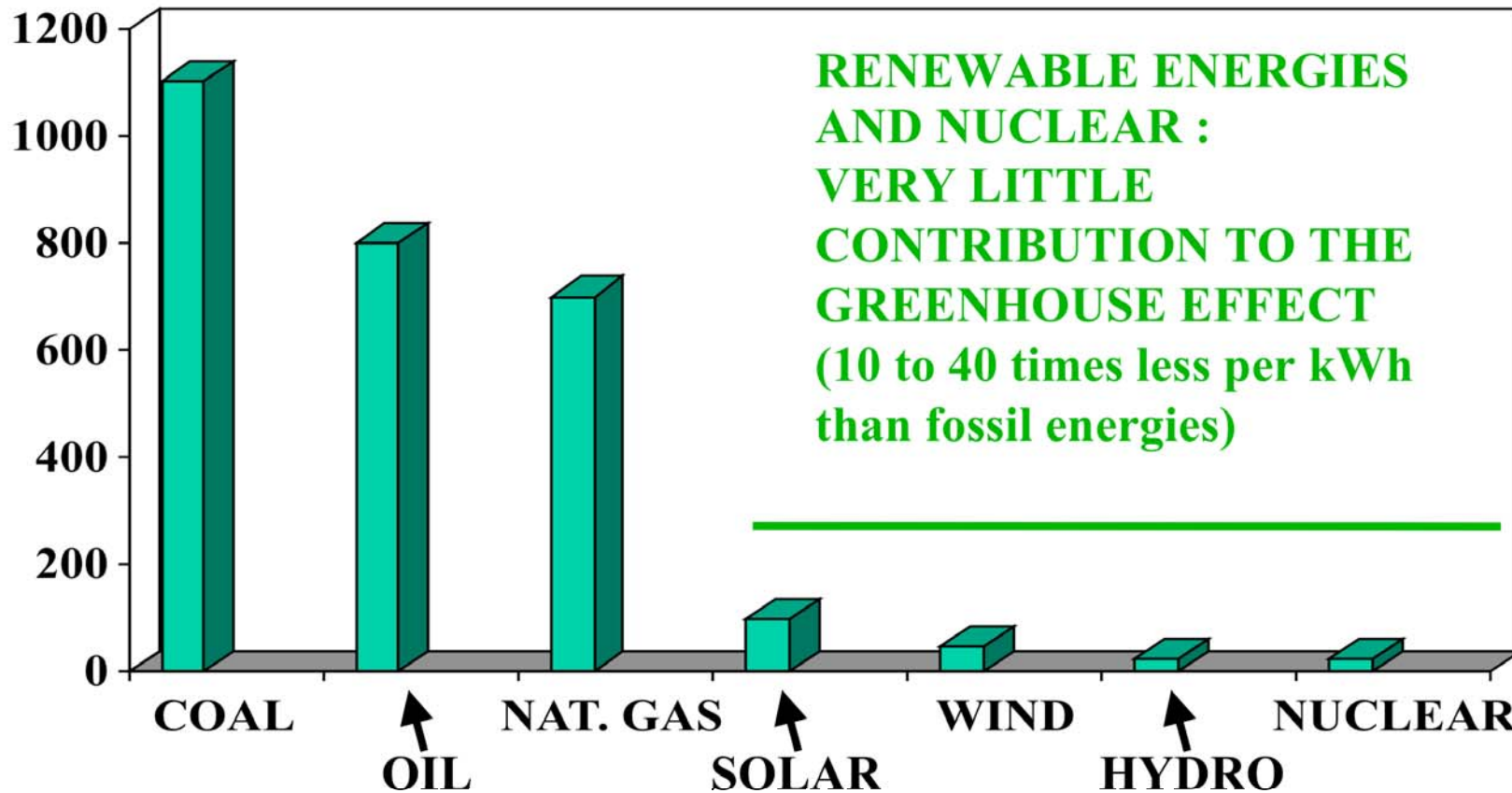
A GLOBAL EFFECT with a long time constant : URGENT action is required.



EFN

GREENHOUSE GAS EMISSIONS OF VARIOUS ENERGY SOURCES

gr CO₂/kWh

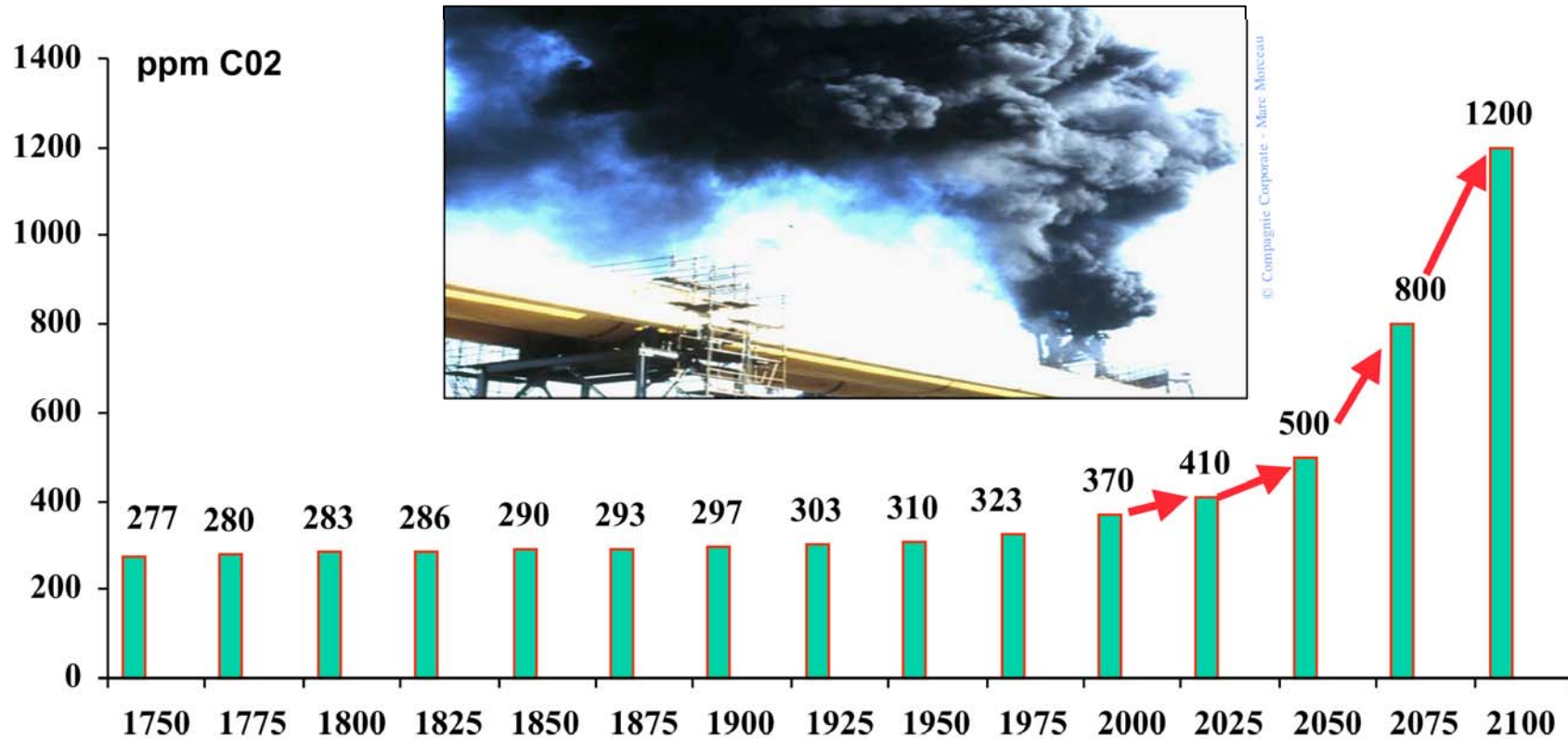


Ref: NEW 01/96



EFN

CO₂ concentration in the atmosphere



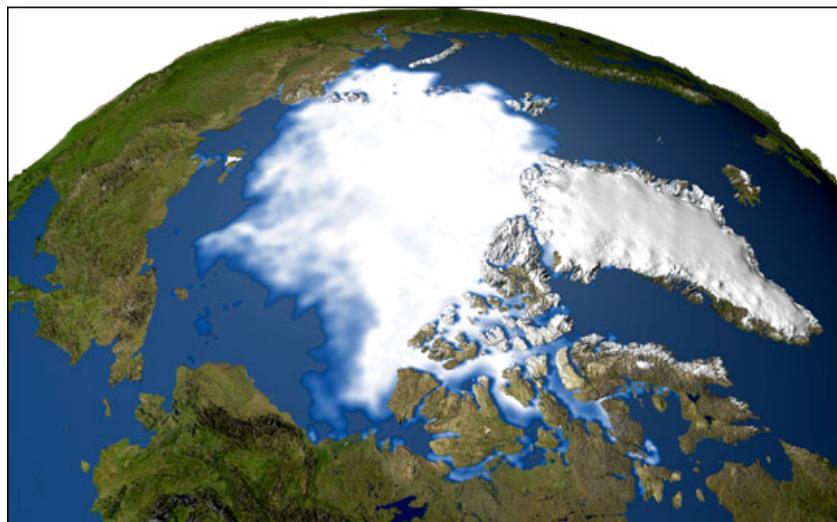
The CO₂ content of the atmosphere is higher than it has ever been in the last 400 000 years, and it continues to rise.



EFN

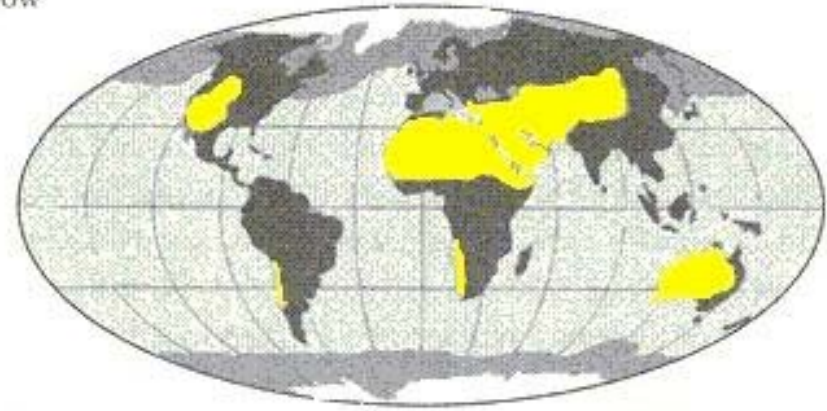


1979 SSMI Composite Data

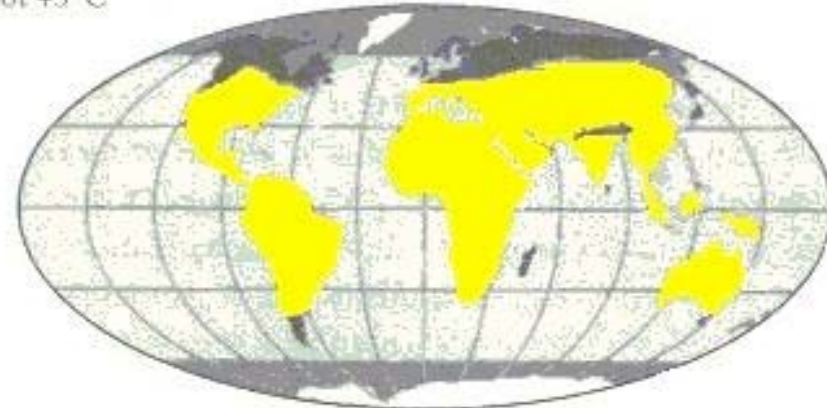


2003 SSMI Composite Data






Now



Hot +5°C



Nature of surface

-  Ice
-  Ocean with life
-  Ocean desert
-  Forests
-  Scrub and desert

Source: The Revenge of Gaia / James Lovelock



EFN

WHAT CAN WE DO ?

1 - ENERGY CONSERVATION

2 - ENERGY EFFICIENCY

3 - CLEANER ENERGIES

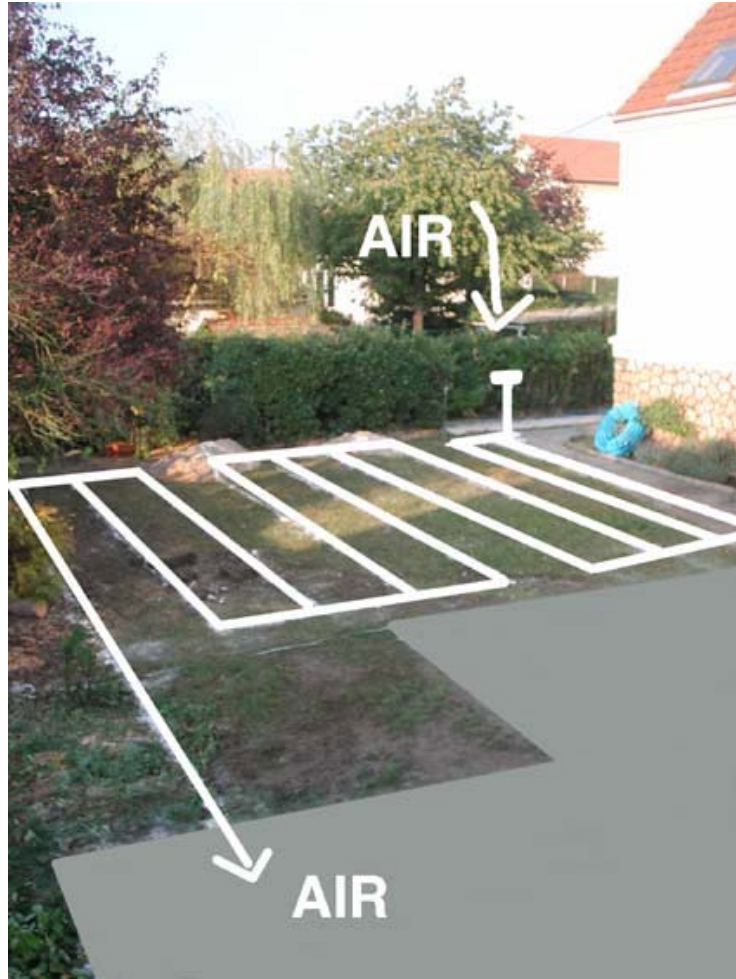
In 20 years divide in developed countries:

- energy consumption by factor 2
- CO2 emissions by factor 4.





Pre-heated air + free air conditioning





Construction Technology

- Better insulation
- Efficient materials
- Pre-heated air
- Heat-pump
- Double-flux ventil.



- > **Consumption divided by 10**
- > **CO2 emissions divided by 100**

Compared to a standard home (gas heated)



Consumer's choices make a huge difference

- Produce and consume less, better and locally
- less transportation
- less wrapping / recycle
- more durable products.



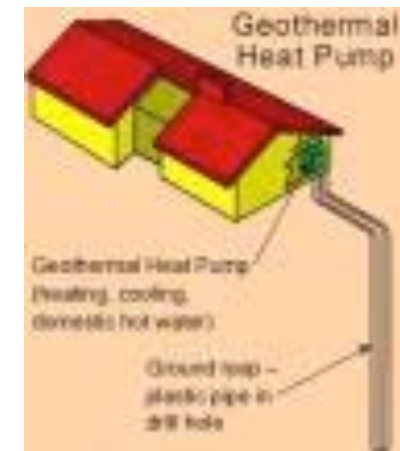
👉 Make the
right choices !



EFN

Clean heat :

- Heat pumps
- solar heating
- cogeneration
- electrify (clean)





EFN



Cleanova - L.I. SVE-Dassault-Heuliez -
2007 Tout élect 200 k ou hybride 500 km

Clean transports



Bluecar - Bolloré - LMP(÷3vol÷5kg - 200km)
10 ans - rech 6 h - 20kE - 125 km/h - 2008

- Make the right choices
- train, public transports
- electric vehicles
- electrify (clean)



« I » Mitsubishi - 400 km - 2010



Clean agriculture



- Less fertilizers
- less oil; be energy conscious
- improve the methods
- more (clean) electricity.



Clean electricity

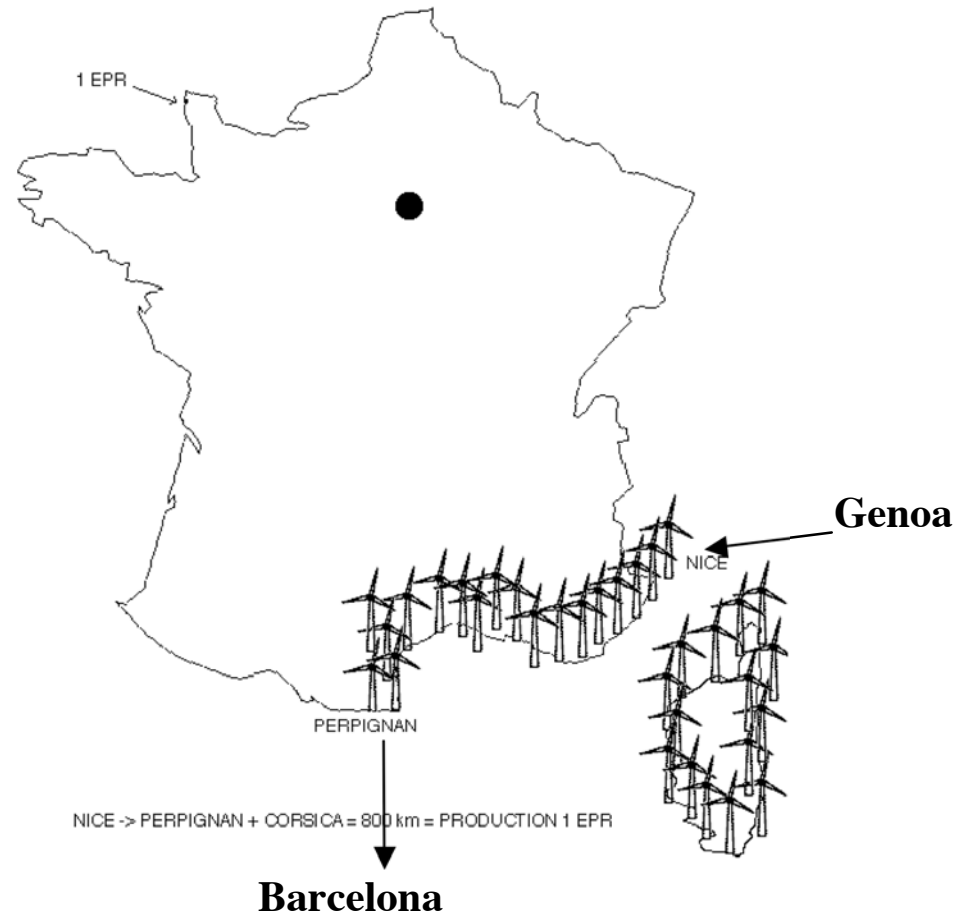
- ban carbon for electricity production
- leaves us with :
- renewables
- nuclear





EFN

WIND ENERGY CAN HELP, BUT WILL NOT SAVE THE PLANET

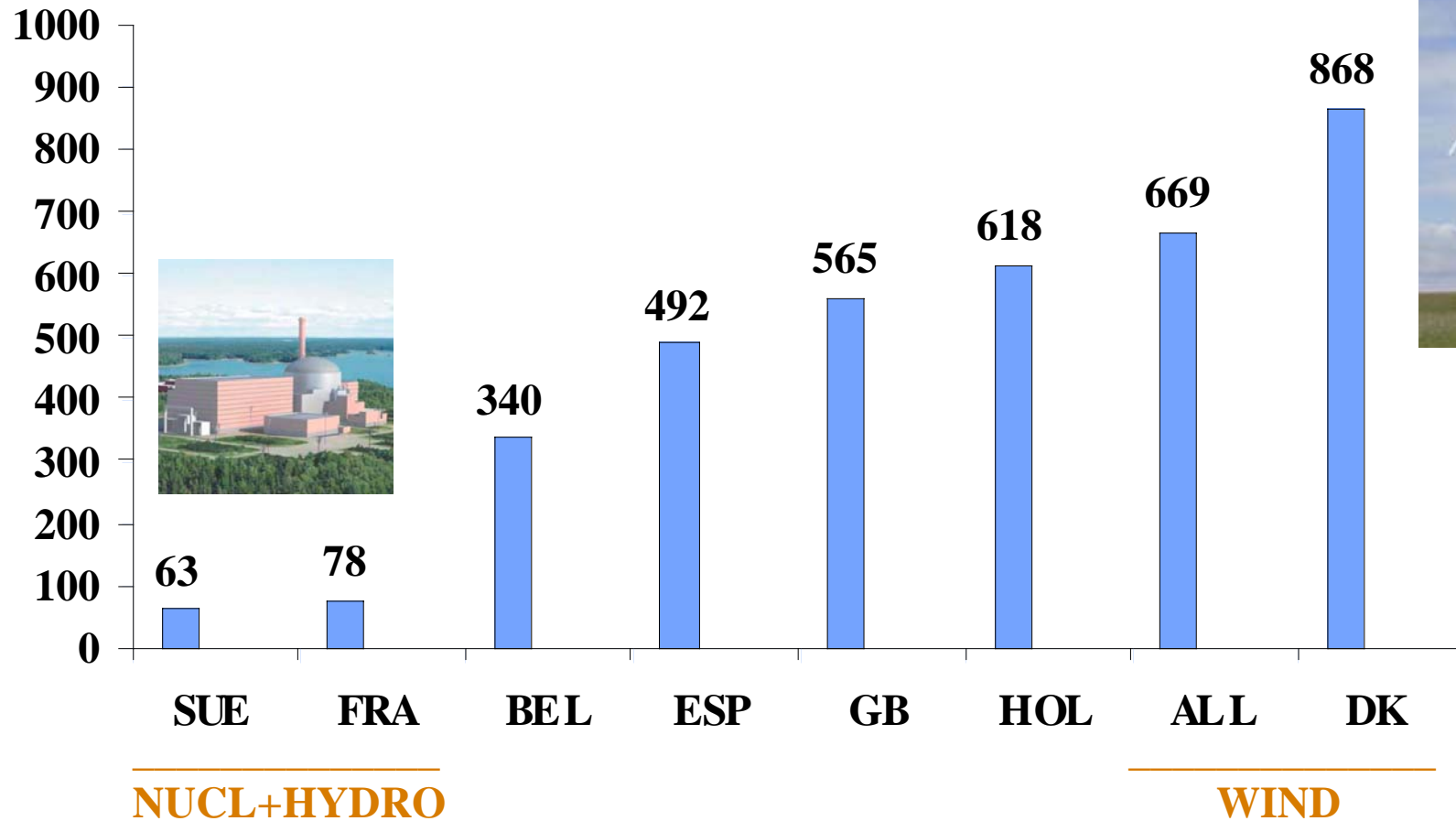




EFN

CO2 EMISSIONS IN EUROPE

(TONS of CO2 /GWh)





EFN

SOLAR ENERGY CAN HELP A LITTLE, BUT IS NOT ENOUGH





All clean energies are necessary



**No fundamental contradiction
between energy conservation
nuclear energy, and renewable energies.**

All clean energies should be developed.



NUCLEAR ENERGY



- Is quite compact
- Factor 1 million
(1g U = 1 Ton oil)
- Consumes very little uranium
(20 T=1m³ per year)
- Produces very small volumes of waste

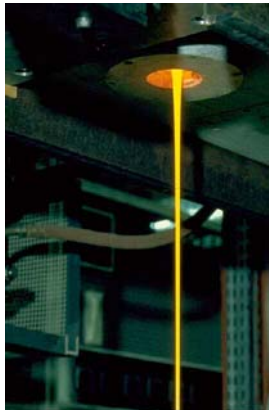


EFN

NUCLEAR WASTE IS NOT A PROBLEM



- **The volume of the waste is small**
- **Nuclear waste is confined - not rejected**
- **Nuclear waste decays spontaneously**

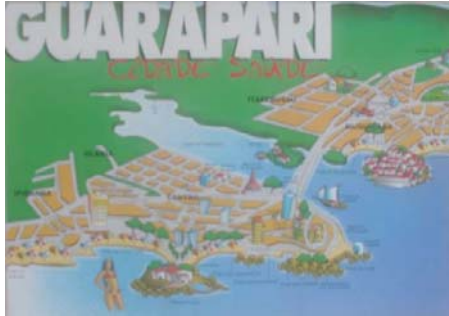


- **Initial toxicity decreases very rapidly**
- **Few meters of earth stops the radiation**
- **Used fuel can be reprocessed**



EFN

Radioactivity is natural



Airplane : 5 $\mu\text{Sv}/\text{hour}$

In Ramsar or Kerala :
30 $\mu\text{Sv}/\text{hr}$ (some houses)

In Guarapari/Brazil :
up to 40 $\mu\text{Sv}/\text{hr}$ (beach)





Reactors of the future



- **Advanced reactors :**
- EPR, AP-1000, ACR, ABWR
- **New HTR reactors :**
- Small, very safe reactors
- For developing countries
- Worst case not dangerous

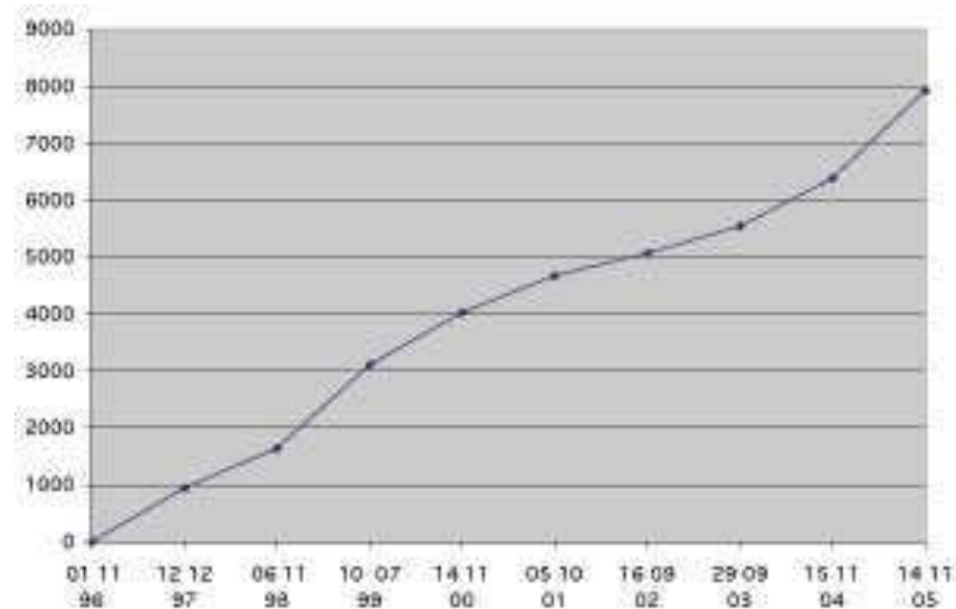
- **Generation IV :**
- Resources x100
- Less waste
- 6 concepts (SFR, LFR, GFR, VHTR, MSR, SCWR)



EFN : Environmentalists For Nuclear Energy



- An international organization gathering over 8000 members and supporters in favor of clean nuclear energy
- Growing rapidly
- In 56 countries
- On all 5 continents.



EFN's mission :
information about energy and the environment



EFN



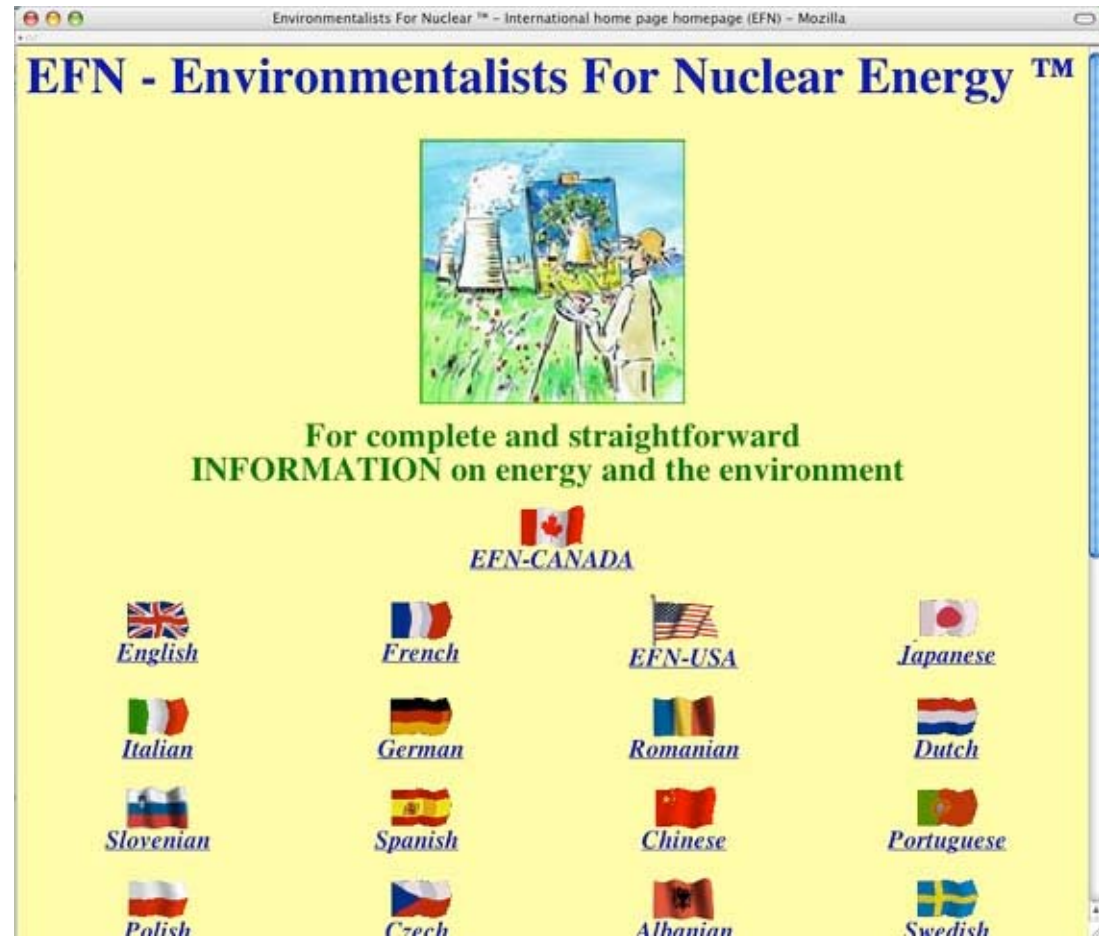
EFN's activities

Web site : www.ecolo.org

in English, French,
German, Spanish,
and 15 languages...



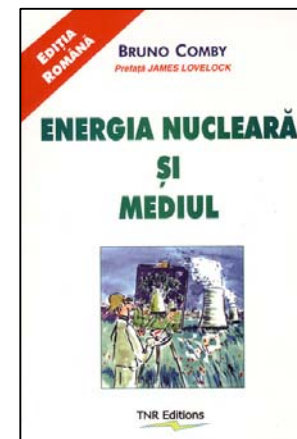
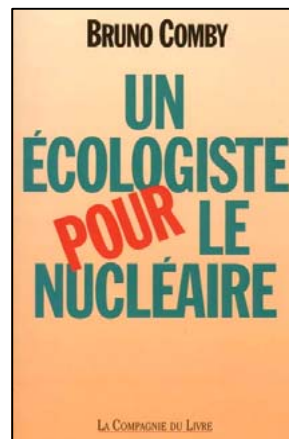
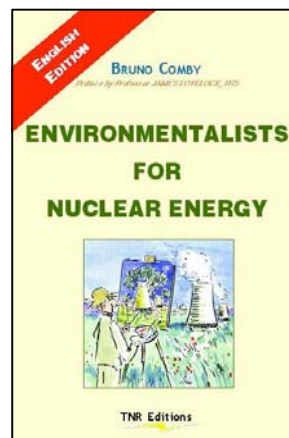
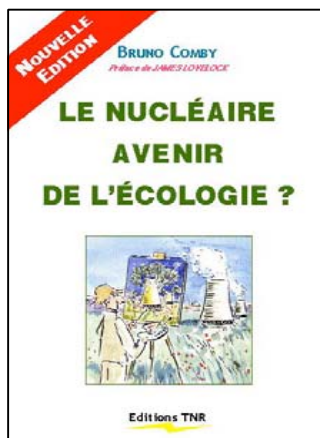
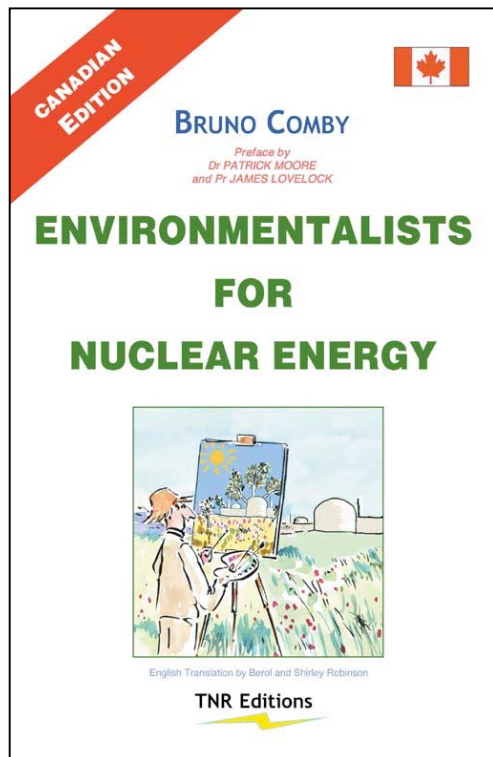
Civaux Nuclear Power Plant





The book:

Bruno Comby's books have informed over one million readers on ecology and the environment published in French, English, Japanese...



Preface by Pr. James Lovelock and Dr. Patrick Moore

www.comby.org -> click on « books »



EFN



© Institut Bruno Comby

Pr. James Lovelock

- **Historical father of environmental thinking since the 1960 's**
- **author of the Gaia theory**
- **member of EFN**

« Nuclear energy is THE ONLY ecological solution »

“ The dangers of continuing to burn fossil fuels as our main energy source (...) threaten not just individuals but civilization itself (...) I hope that it is not too late for the world to emulate France and make nuclear power our principal source of energy. There is at present no other safe, practical and economic substitute for the dangerous practice of burning carbon fuels. ” (in his preface to Bruno Comby's book)



EFN

Some Environmentalists For Nuclear Energy (members of EFN)

Dr Patrick MOORE, EFN-Canada

Founder of Greenpeace, former President of Greenpeace-Canada and director of Greenpeace international, now Honorary chairman of EFN-CANADA

Photo rights reserved



Bishop Hugh MONTEFIORE, UK

Former member of the Board of Friends of the Earth



Dr Yumi AKIMOTO and Kazuhiza MORI



Survivors of Hiroshima explosion





We have only one planet



© Luc Massart/ IBC



A livable future



for
our
children



and future generations...

CONCLUSION

**NUCLEAR ENERGY
WELL DESIGNED, WELL BUILT,
WELL OPERATED IS**

**SAFE, CLEAN, AND ESSENTIAL
FOR OUR FUTURE.**





EFN



More information :
www.ecolo.org

The book : **www.comby.org**

Contact : **bruno@ecolo.org**
efn@ecolo.org

© COPYRIGHT - All rights reserved