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# *Environmental benefits of nuclear energy*



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Tomsk - 27 oct 2009

by Bruno Comby



Independent scientist,  
Director of the Comby institute (IBC)  
Founder and President of EFN  
(Environmentalists For Nuclear Energy)



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## **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 independence**

**Risks and accidents**

**EFN - Conclusion**



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# Why an environmentalist is in favor of nuclear energy ?

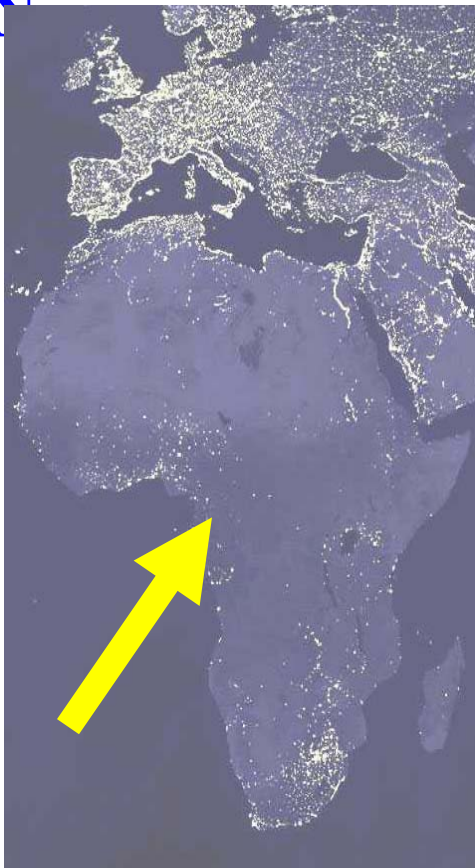




# The life of an environmentalist - childhood in nature



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France



Gabon



United States



Canada ...





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## The life of an independent scientist - Scientific background

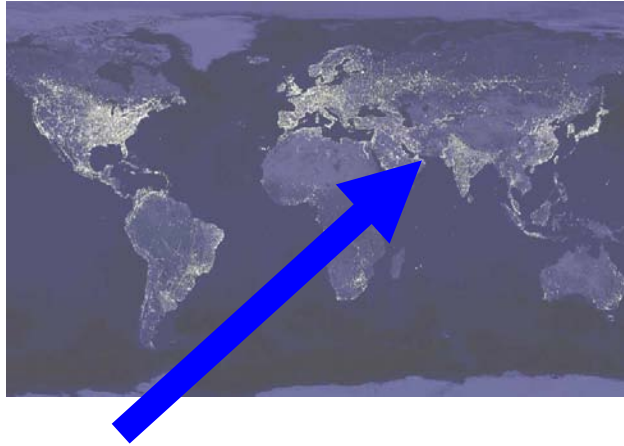


Graduate in nuclear physics (Ecole Polytechnique Paris + National University of Technical Sciences)



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## The life of an independent scientist - Military service



War zone :  
Persian Gulf  
Hormuz strait

Problem :  
Safety of oil tankers



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# 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.



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# Bruno Comby - a non smoking pioneer





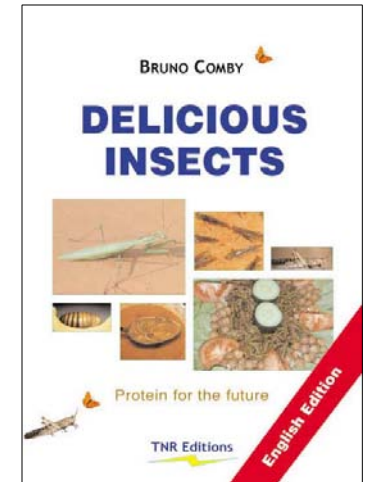
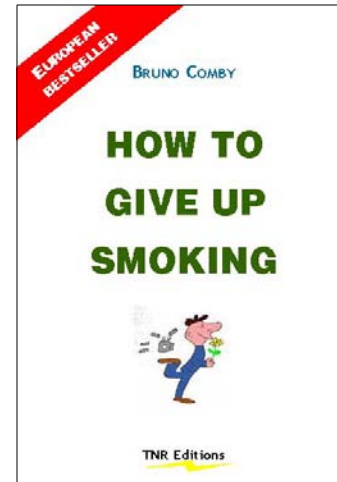
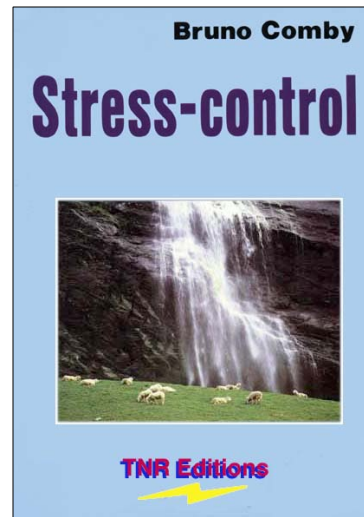
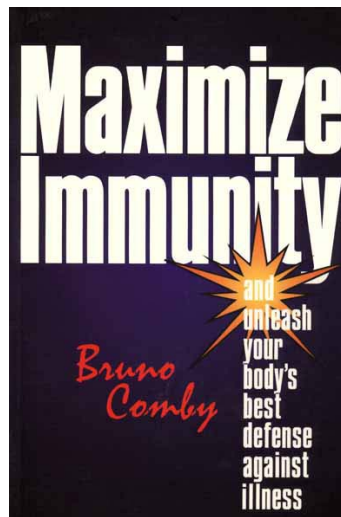


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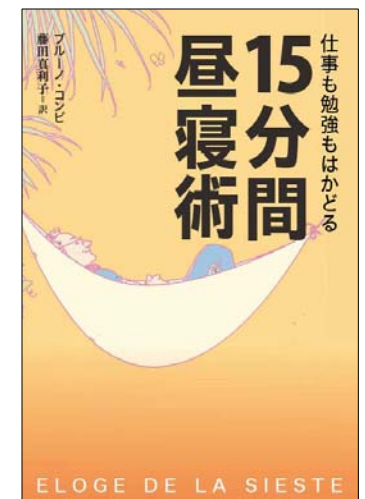
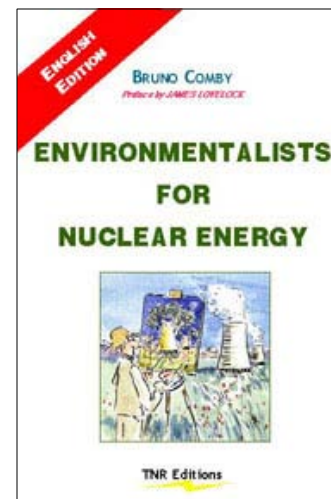
# The life of an environmentalist - research and books

## 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



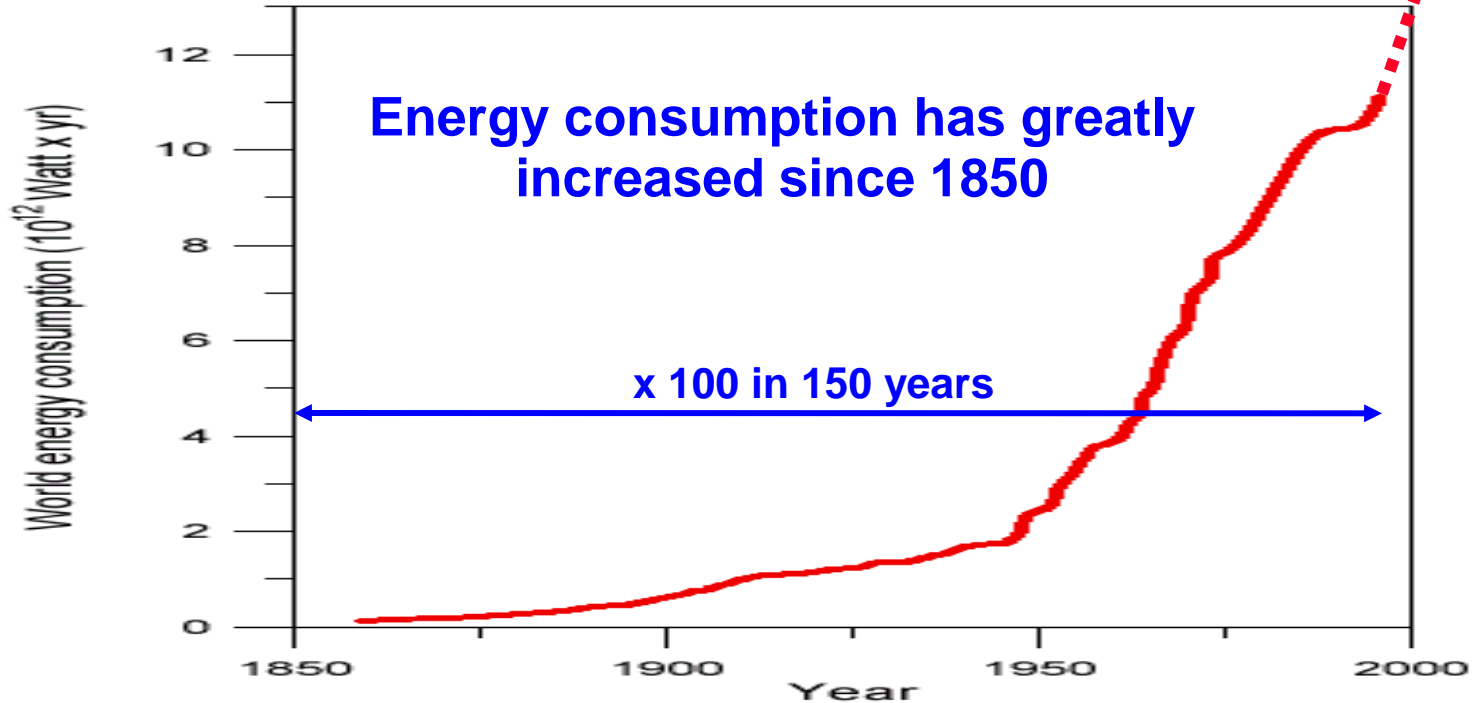
**Today, 20% of the world's population consumes  
60% of the energy**

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



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# World Energy Consumption since the Industrial Revolution



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



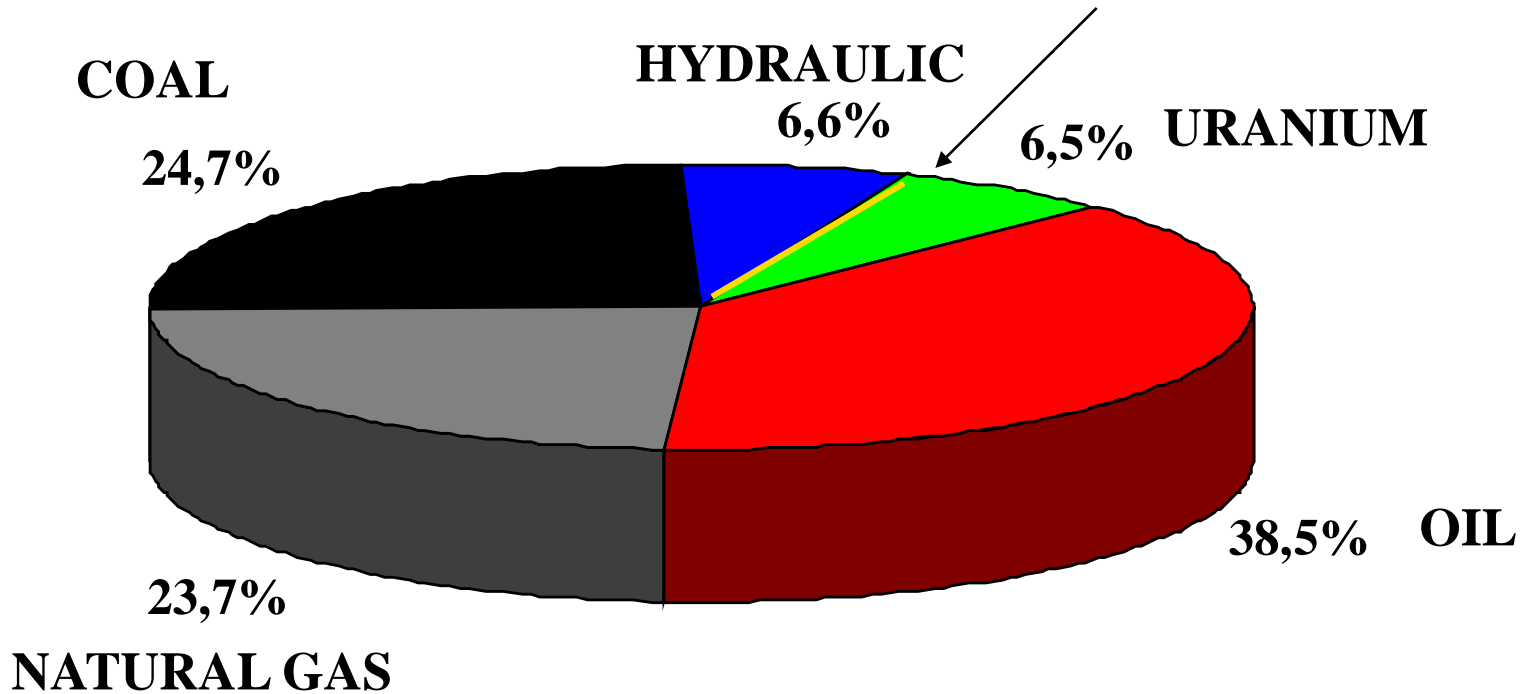
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# **ENERGY SOURCES**

**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 ~> 10 Gtoe/yr**

**Source : BP 2002**



# GreenHouse Gas Effect



20<sup>th</sup> century : +0.5 to 1°C

21<sup>st</sup> century : +3 to 10° C

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

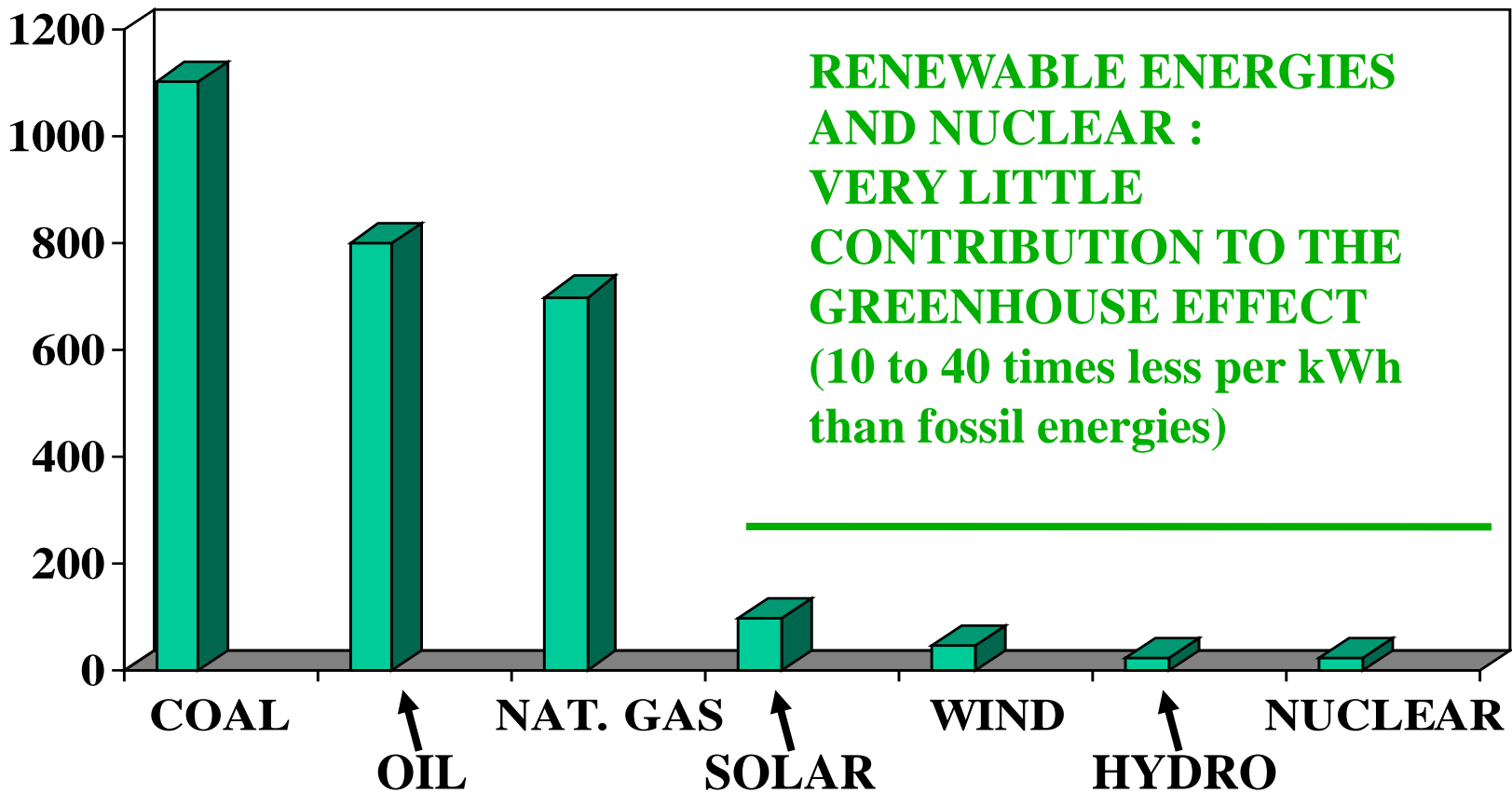
**A GLOBAL EFFECT with a long time constant : URGENT action is required.**



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# GREENHOUSE GAS EMISSIONS OF VARIOUS ENERGY SOURCES

gr CO<sub>2</sub>/kWh

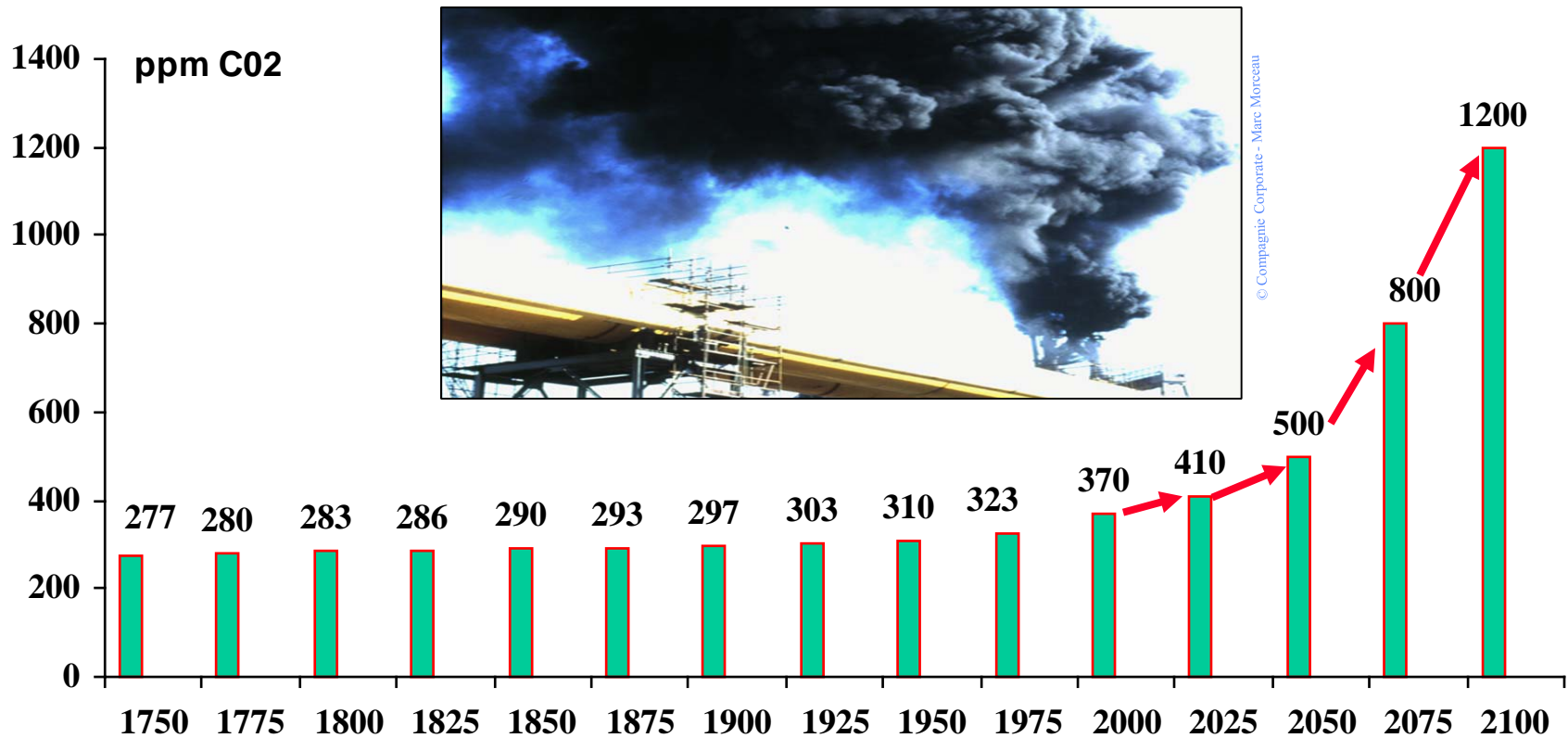


Ref: NEW 01/96



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# CO<sub>2</sub> concentration in the atmosphere



**The CO<sub>2</sub> content of the atmosphere is higher than it has ever been in the last 400 000 years, and it continues to rise.**



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# 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.







# Ecological construction

**Eco-house  
that requires  
20 times less  
energy and  
emits 200 times  
less CO<sub>2</sub>.**

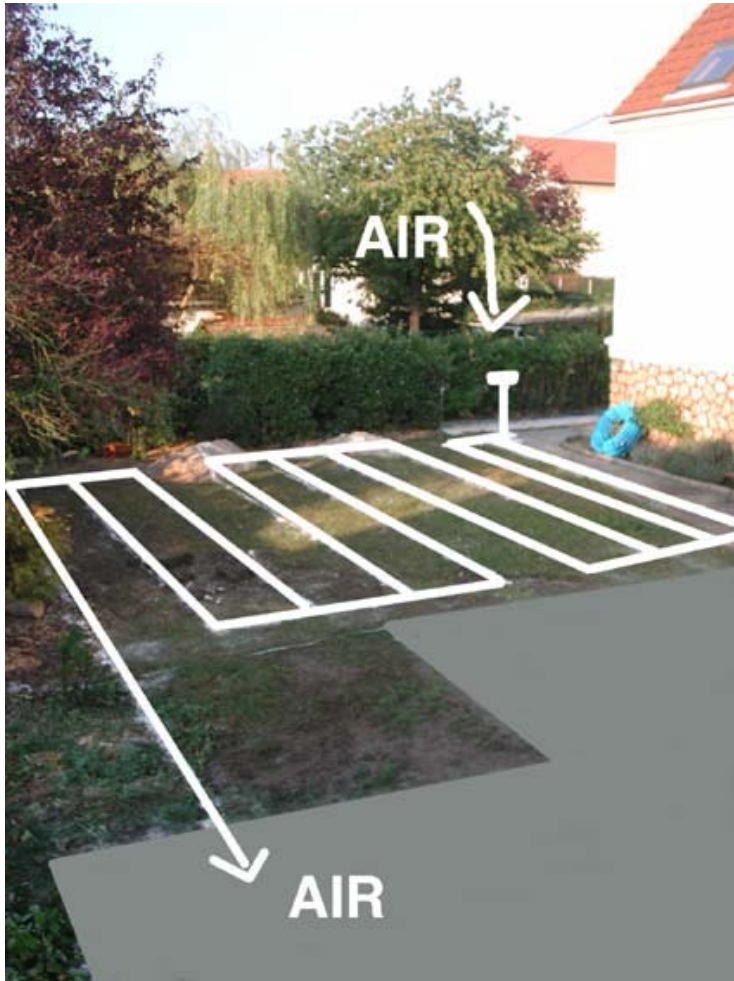




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# Pre-heated air

+ free air conditioning







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# Electric cars

Friendly - Li-Ph - Heuliez - 2010 - 230 km



Bluecar - Bolloré  
LMP+condens - 250km - 2010

REVA - Li-ion - 120 km -  
available



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# Electrify and produce clean electricity

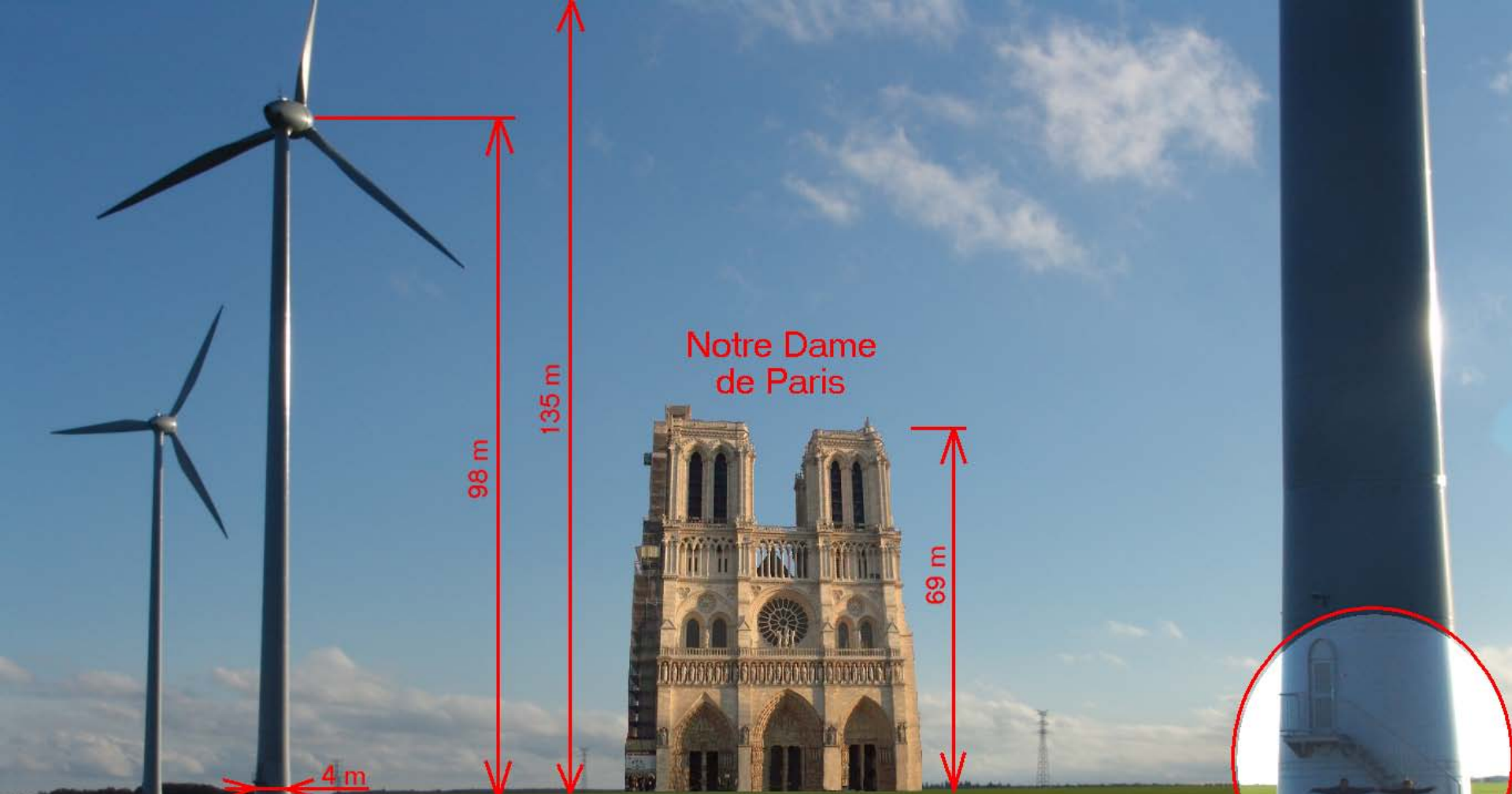
- ban carbon for  
electricity  
production

leaves us with :

- renewables
- nuclear







Notre Dame  
de Paris

98 m

135 m

69 m

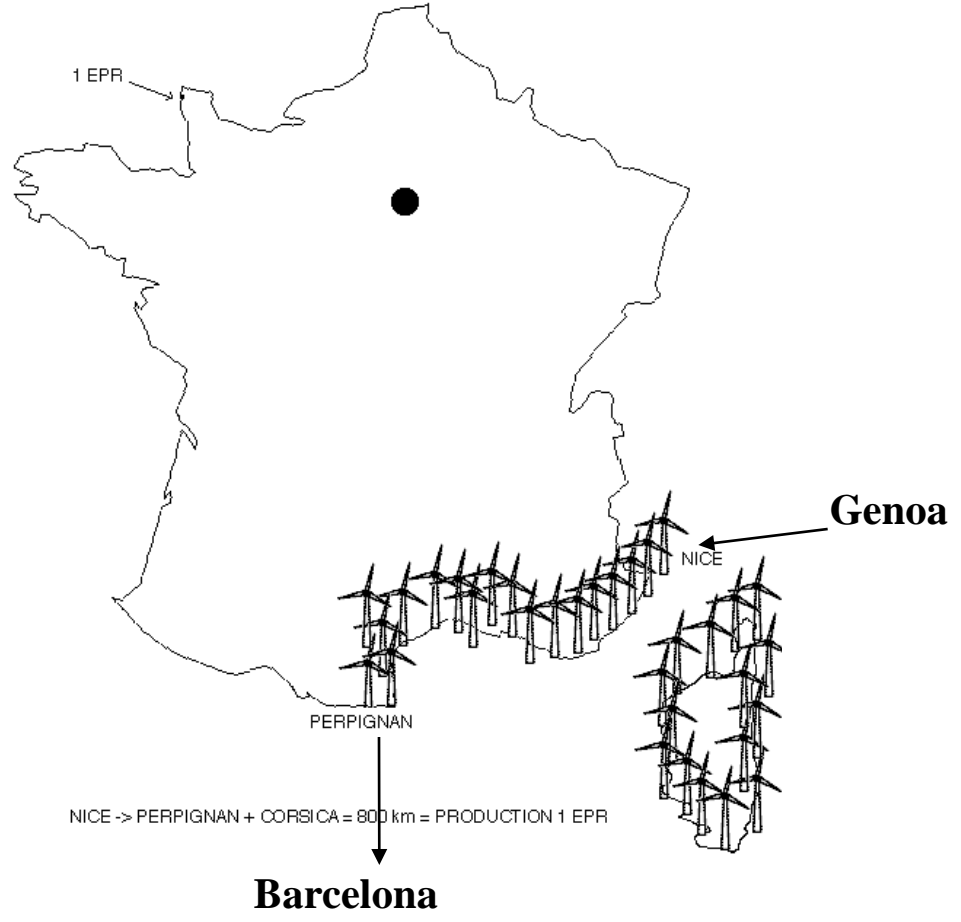
4 m

Des éoliennes deux fois plus hautes  
que la cathédrale Notre Dame de Paris



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# WIND ENERGY CAN HELP, BUT WILL NOT SAVE THE PLANET

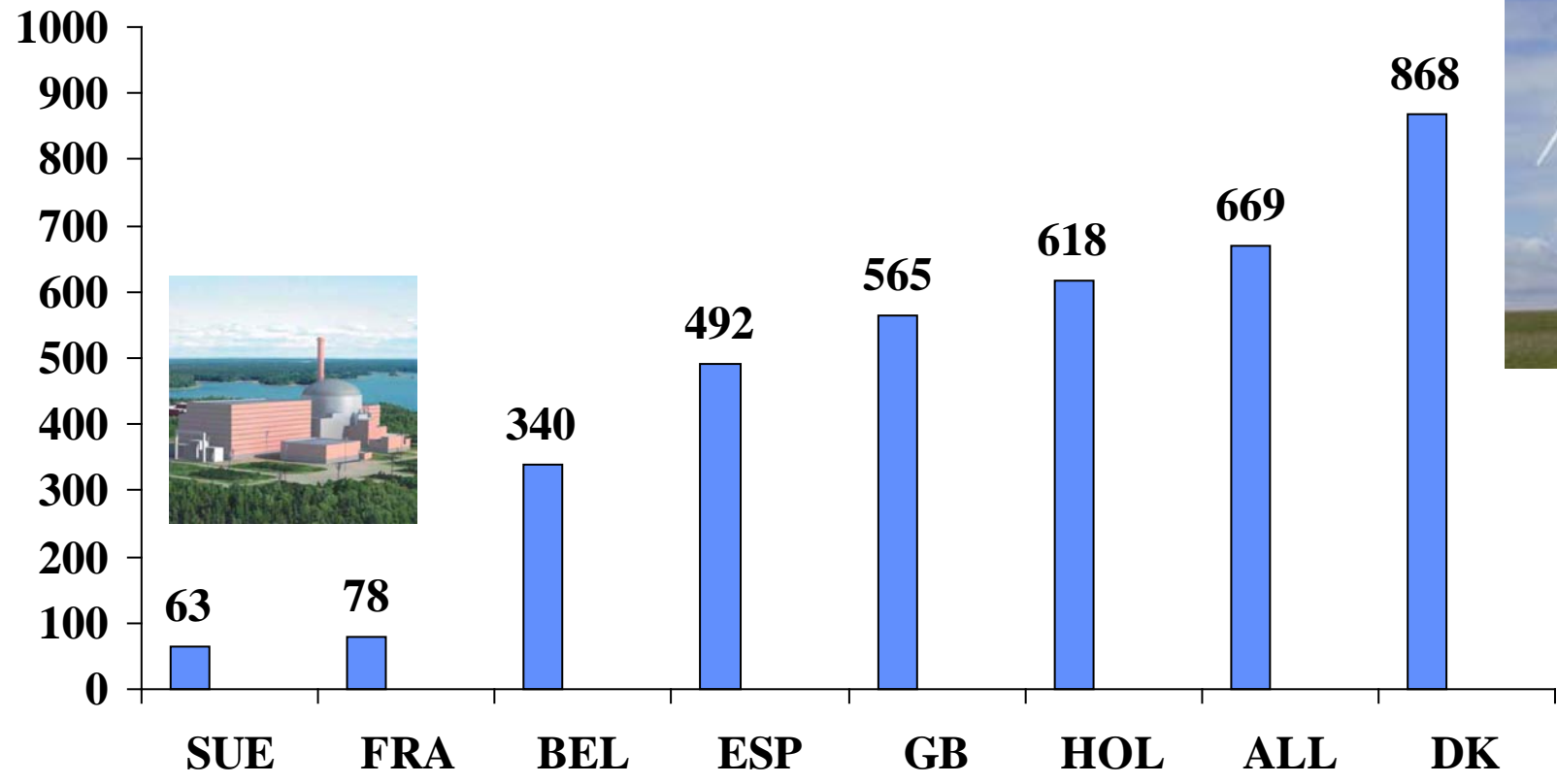




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# CO2 EMISSIONS IN EUROPE

(TONS of CO2 /GWh)



**NUCL+HYDRO**

**WIND**



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# SOLAR ENERGY CAN HELP A LITTLE, BUT IS NOT ENOUGH







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# NUCLEAR ENERGY



- **Is quite compact**
- **Factor 1 million**  
**(1g U = 1 Ton oil)**
- **Consumes very little uranium**  
**(20 T=1m<sup>3</sup> per year)**
- **Produces very small volumes of waste**

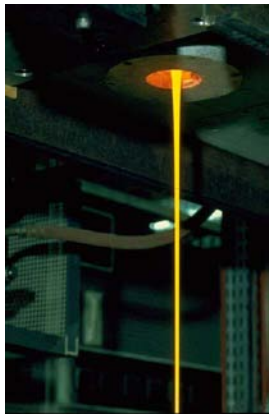


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# **NUCLEAR WASTE IS NOT A PROBLEM**



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

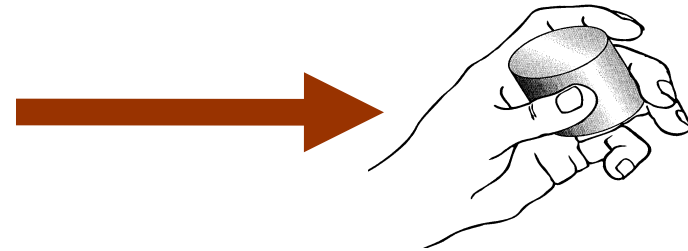
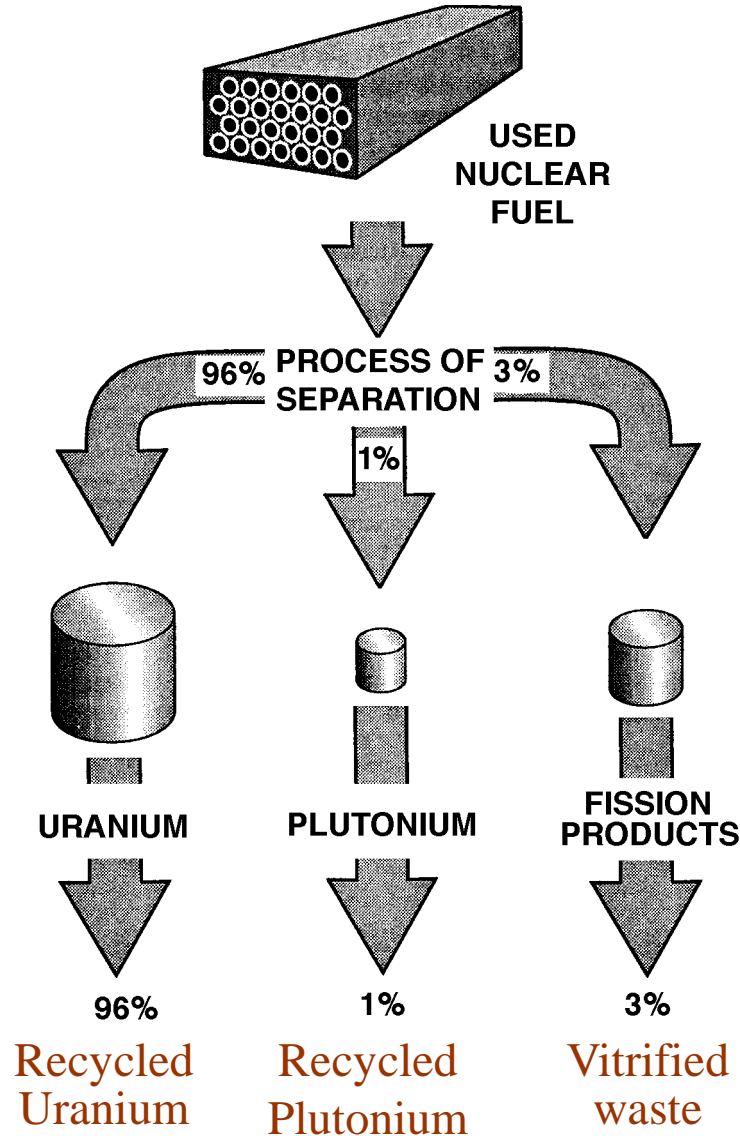


- **Initial toxicity decreases very rapidly**
- **Few meters of earth stops the radiation**
- **Used fuel can be reprocessed**



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# REPROCESSING OF NUCLEAR FUEL IS ECOLOGICAL



Volume of  
vitrified waste  
produced by a typical  
French family  
in 30 years



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# Radioactivity is natural



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

In Guarapari (Brazil) :  
up to 50  $\mu\text{Sv}/\text{hr}$  on beach

In Ramsar (Caspian Sea) :  
up to 150  $\mu\text{Sv}/\text{hr}$  in houses





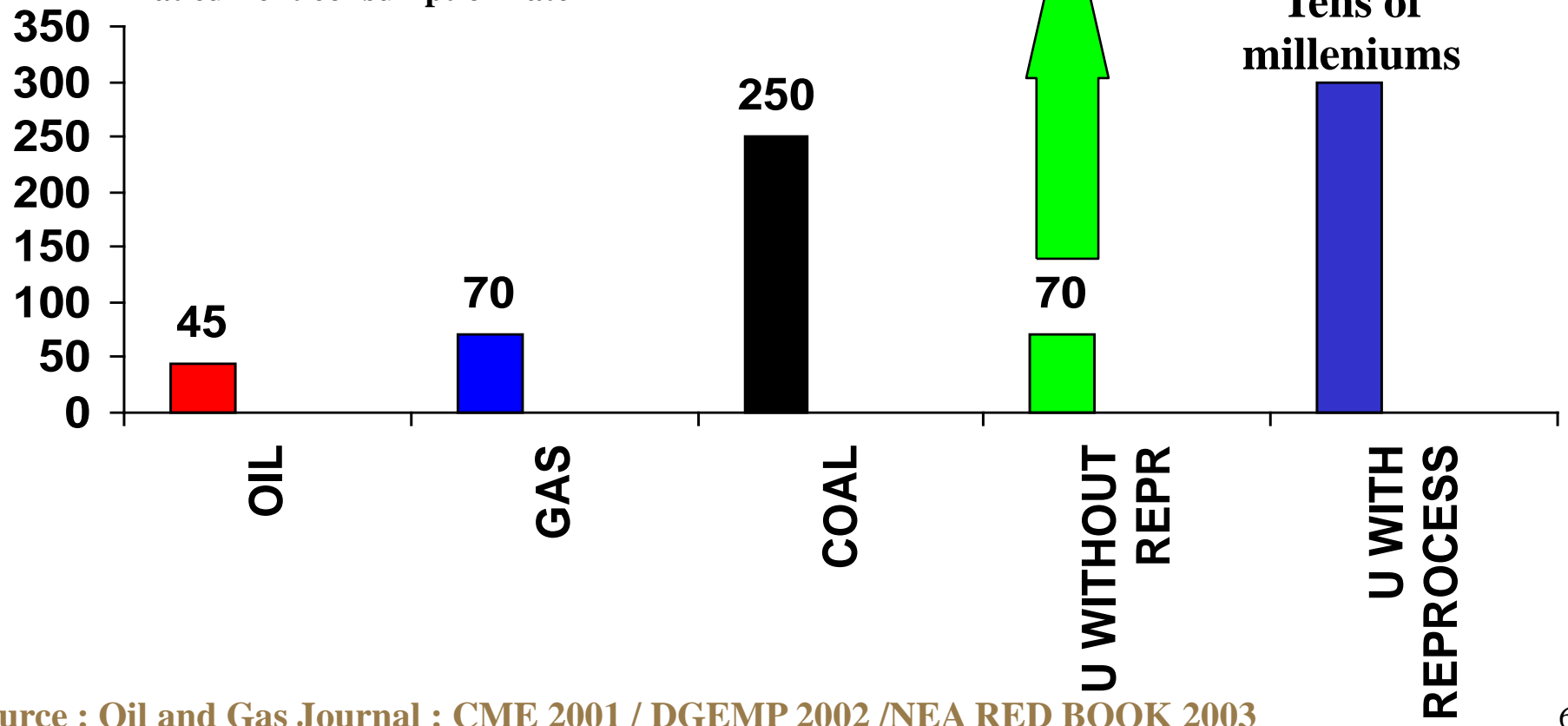




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# PROVEN RESERVES

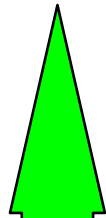
**YEARS**  
at current consumption rate



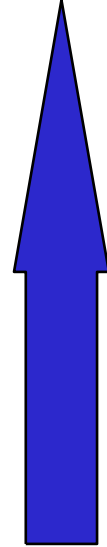
> 500



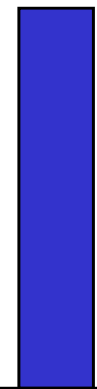
400



70



Tens of  
milleniums



U WITH  
REPROCESS



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# 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)



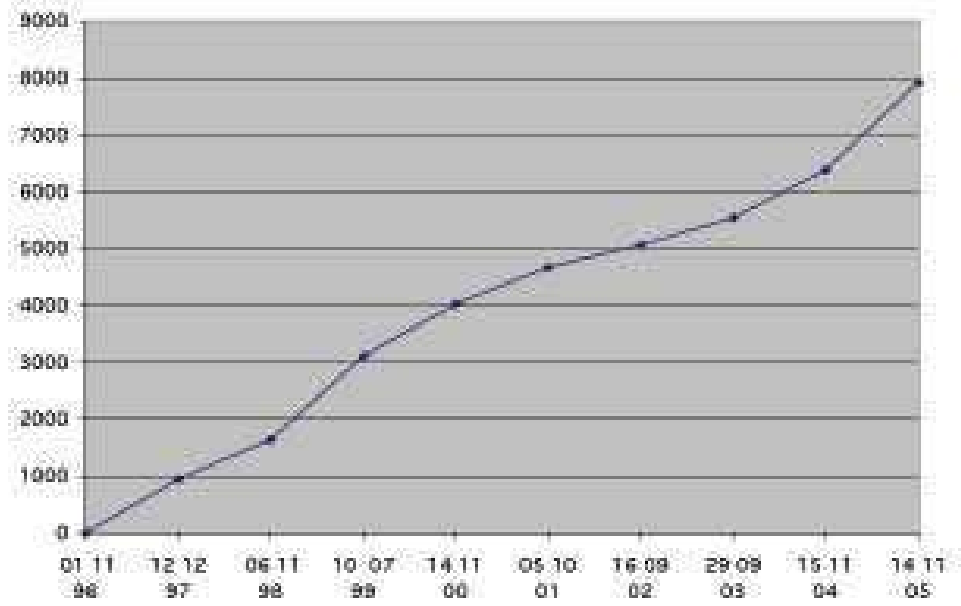
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# EFN : Environmentalists For Nuclear Energy



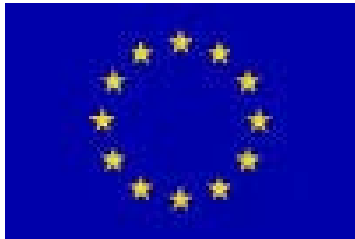
- An international organization gathering over 9000 members and supporters in favor of clean nuclear energy
- Growing rapidly
- In 56 countries
- On all 5 continents.



**EFN's mission :**  
**information about energy and the environment**



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# EFN's activities

Web site : [www.ecolo.org](http://www.ecolo.org)

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



Civaux Nuclear Power Plant

Environmentalists For Nuclear™ - International home page homepage (EFN) - Mozilla

## EFN - Environmentalists For Nuclear Energy™

For complete and straightforward  
**INFORMATION** on energy and the environment

**EEN-CANADA**

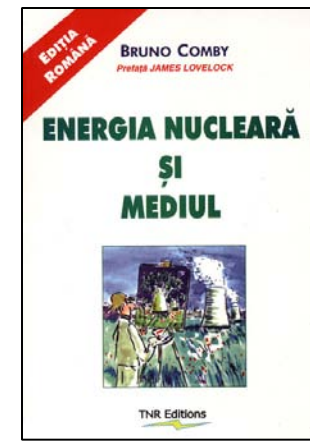
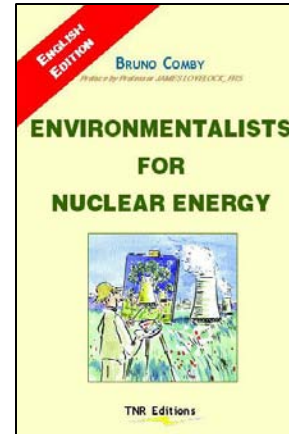
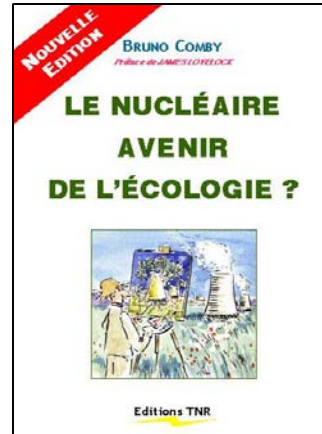
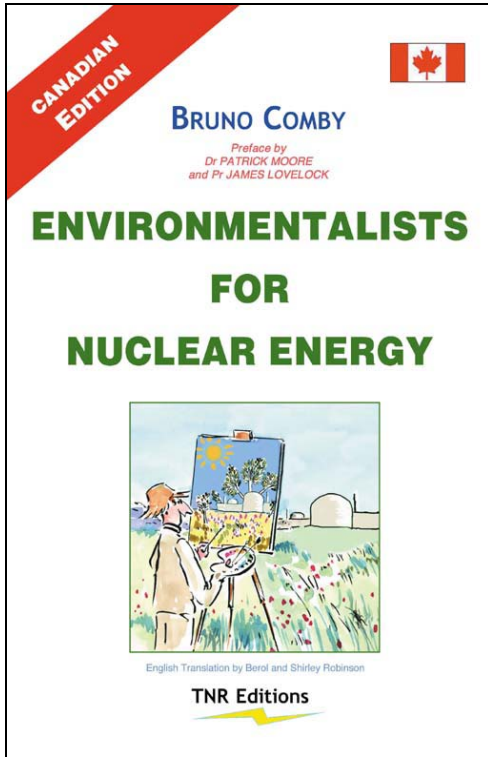
<i>English</i>	<i>French</i>	<i>EFN-USA</i>	<i>Japanese</i>
<i>Italian</i>	<i>German</i>	<i>Romanian</i>	<i>Dutch</i>
<i>Slovenian</i>	<i>Spanish</i>	<i>Chinese</i>	<i>Portuguese</i>
<i>Polish</i>	<i>Czech</i>	<i>Albanian</i>	<i>Swedish</i>



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# 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](http://www.comby.org) -> click on « books »





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# 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.” (in his preface to Bruno Comby’s book)



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# Other Environmentalists For Nuclear (members of EFN)

**Patrick MOORE, EFN-Canada**



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



**Bishop Hugh MONTEFIORE, UK**

Former member of the Board of Friends of the Earth

**Yumi AKIMOTO**



Survivor of Hiroshima explosion

**GuI GOKTEPE**

Award of UN Black Sea Medal environmental prize





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# We have only one planet



© Luc Massart/ IBC





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# A livable future



**for  
our  
children**

**and future generations...**



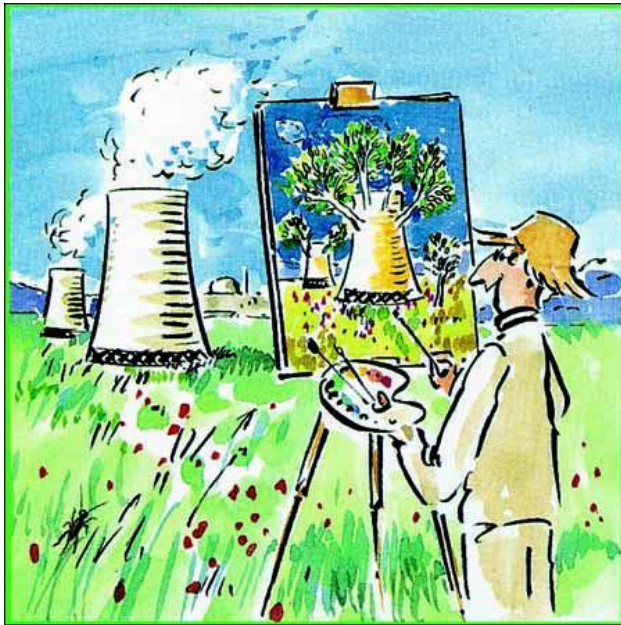
# CONCLUSION

A MAJOR ENERGY CRISIS IS  
DOWN THE ROAD

THE WORLD NEEDS A LOT  
MORE ENERGY  
CONSERVATION, RENEWABLE  
ENERGIES AND CLEAN  
NUCLEAR ENERGY  
ARE NECESSARY



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**More information :**  
**[www.ecolo.org](http://www.ecolo.org)**

**The book : [www.comby.org](http://www.comby.org)**

**Contact : [bruno\[at\]ecolo.org](mailto:bruno[at]ecolo.org)  
[efn\[at\]ecolo.org](mailto:efn[at]ecolo.org)**

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