Prospérité sans croissance

Gaël Giraud
Chief economist | AFD,
Senior researcher | CNRS
Professor | ENPC
Director | Energy and Prosperity chair


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cdc
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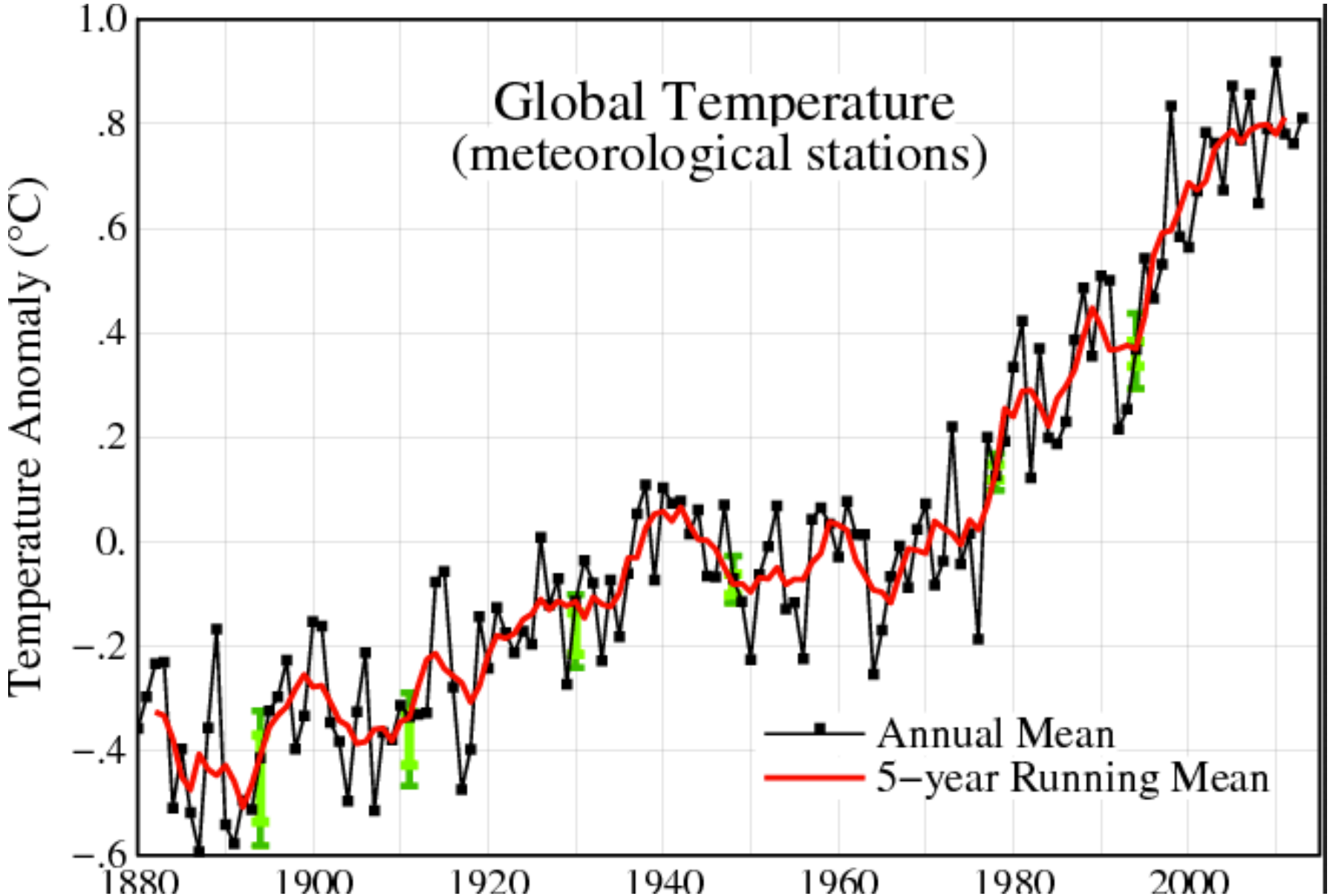
SNCF

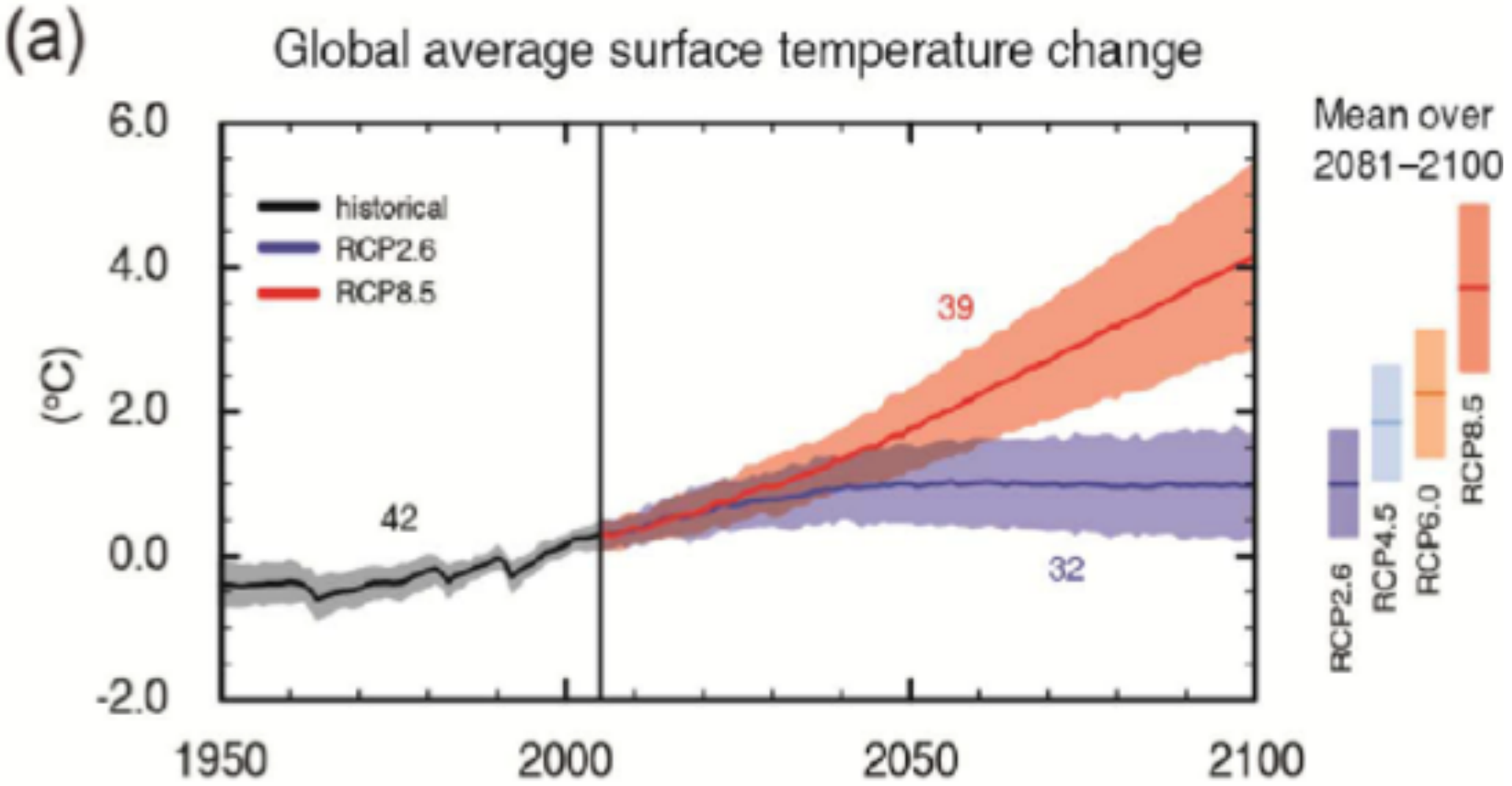
Anthropogenic origin of climate change is now well understood

(IPCC http://www.ipcc.ch)



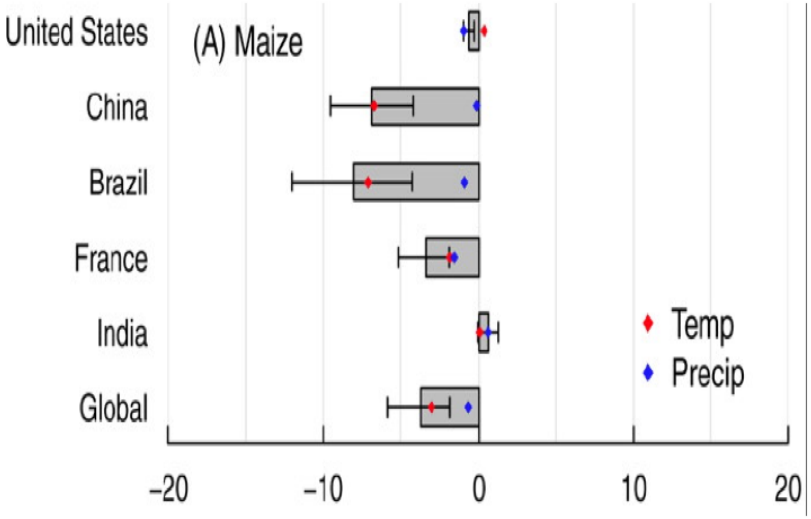
(NASA GISS Janvier 2014)

Business as usual leads to + 5°C.
Too late for <+2°C.

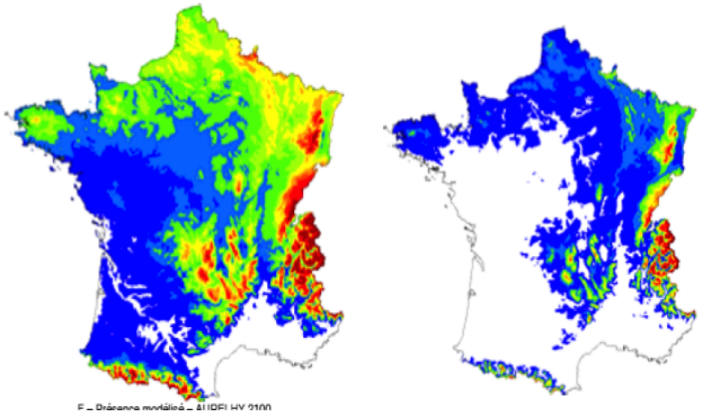


GIEC 2013

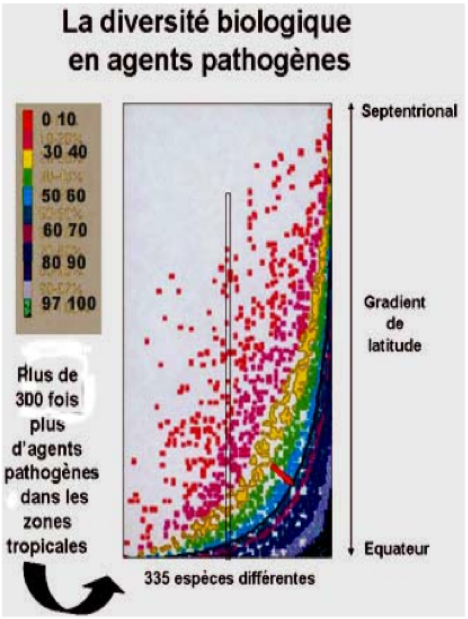
Avec une ampleur qui dépendra de nos émissions



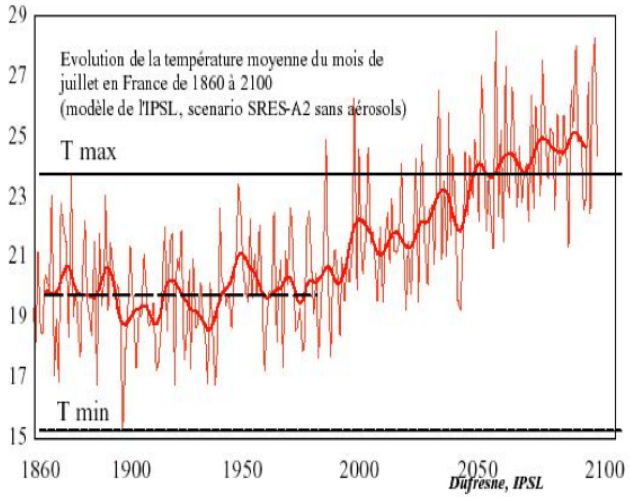
Baisse des rendements agricoles



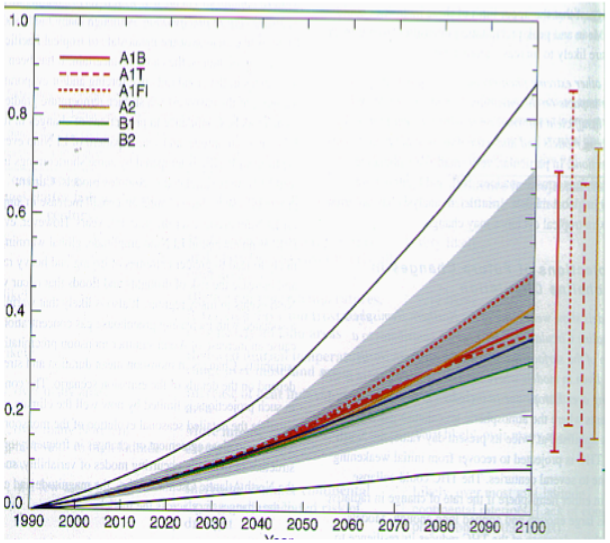
Atteinte aux écosystèmes



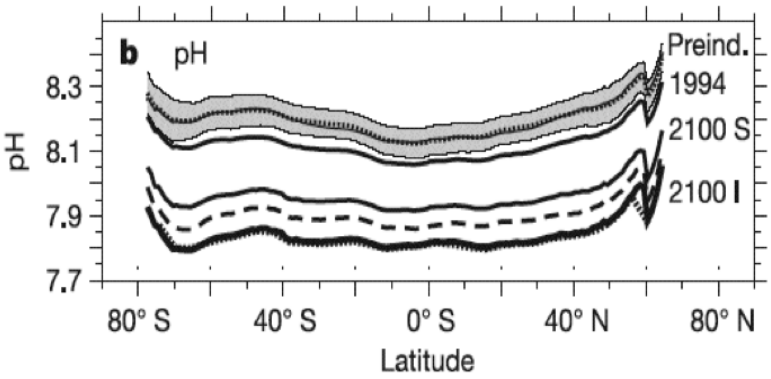
Agents pathogènes



Vagues de chaleur

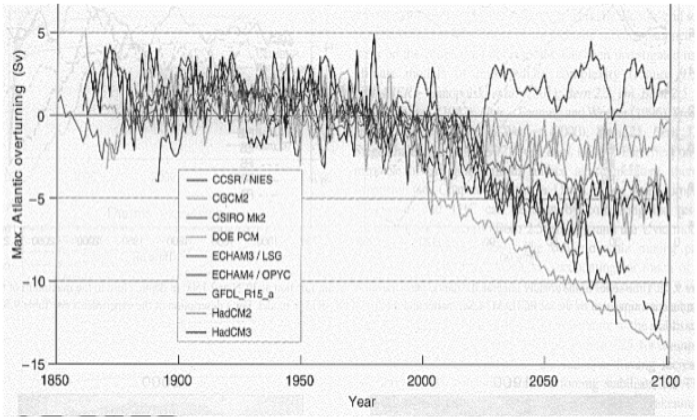


Hausse du niveau de l'océan

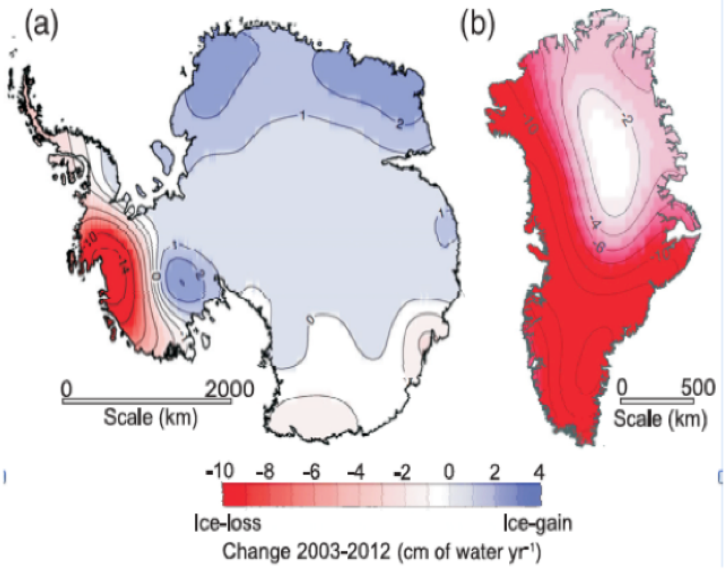


Acidification de l'océan

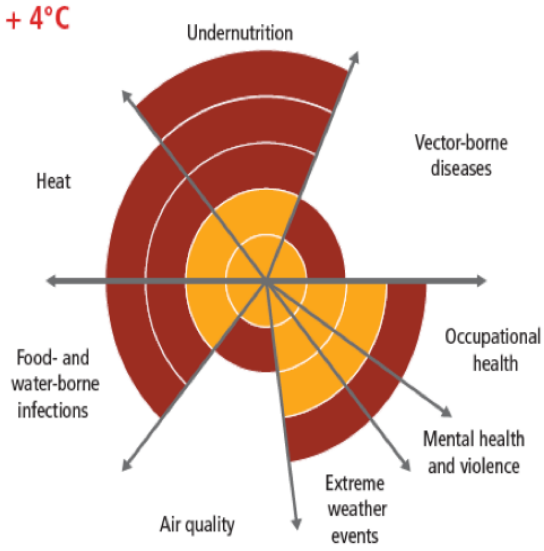
Avec une ampleur qui dépendra de nos émissions



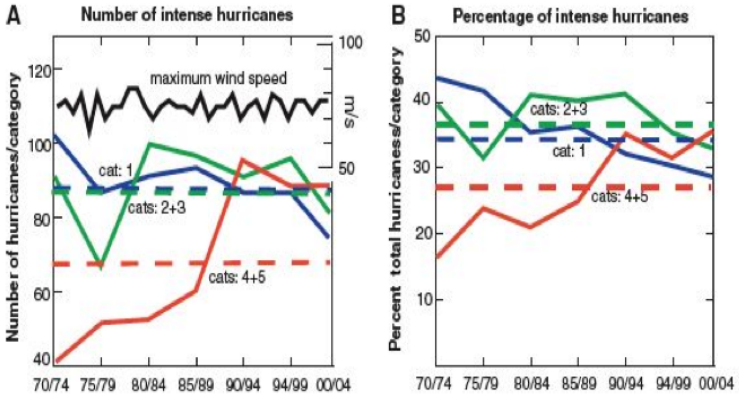
Changement de la circulation océanique



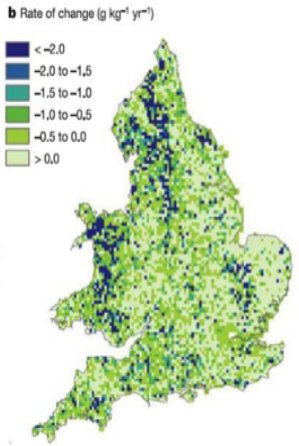
Fonte/désagrégation des calottes



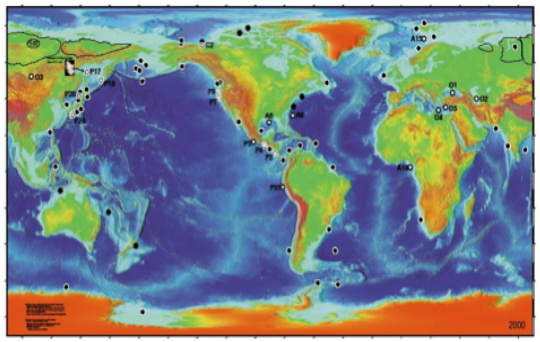
Conséquences sanitaires



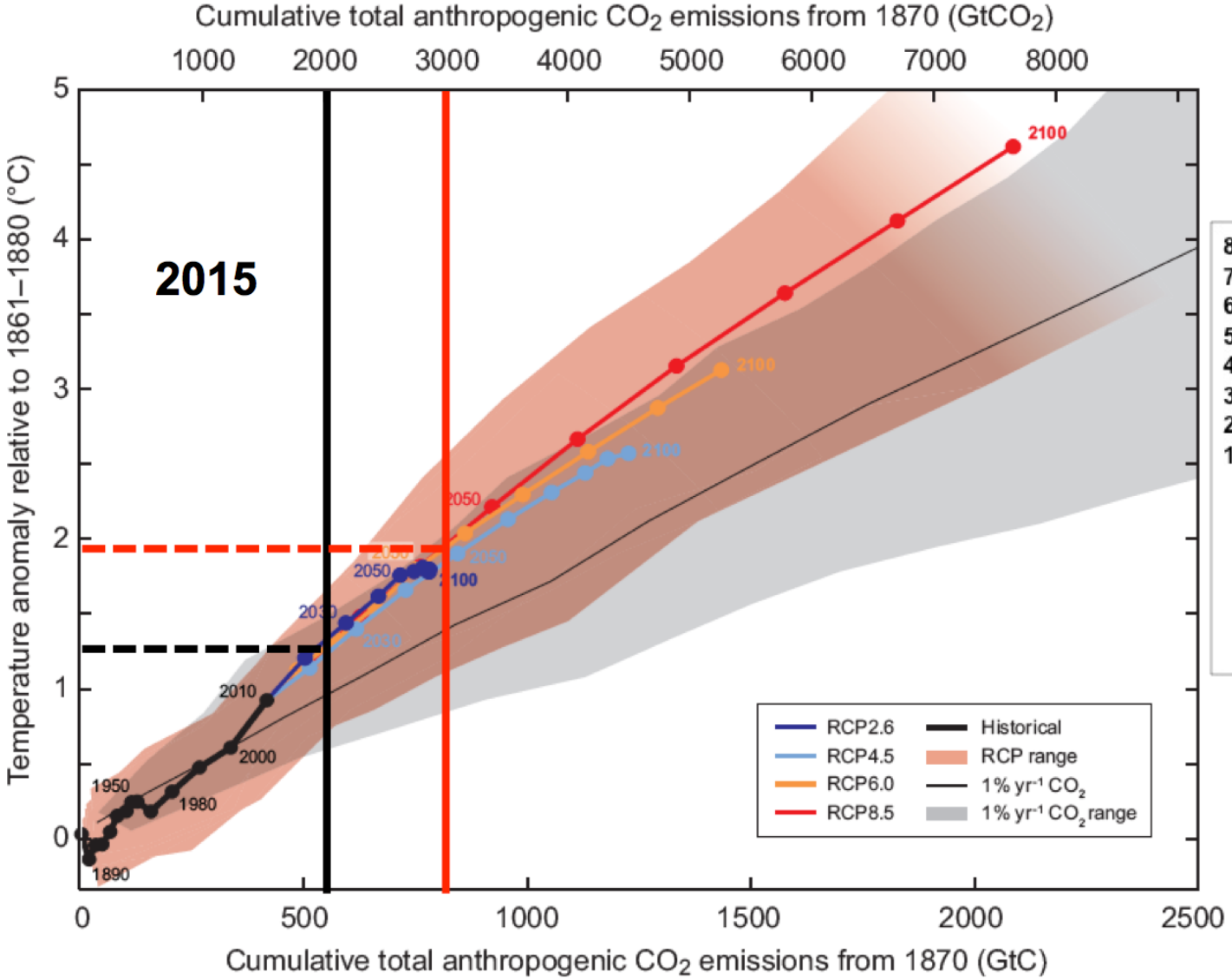
Intensification des phénomènes extrêmes

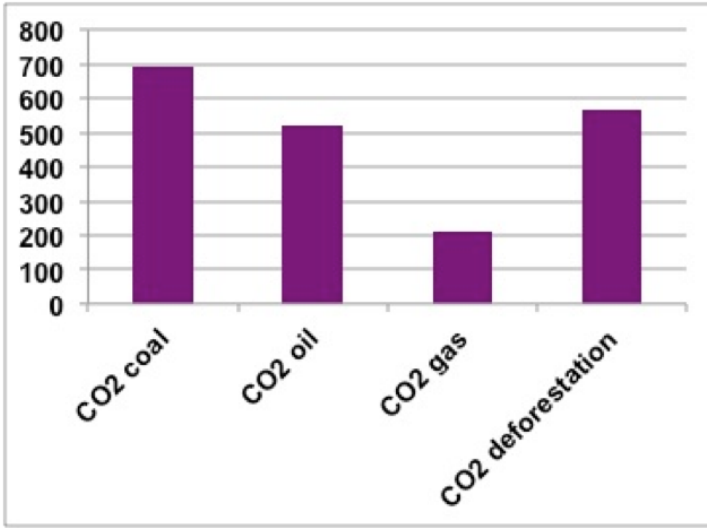


Relargage du carbone des sols



Et nous ne verrons jamais venir à l'avance toutes les conséquences possibles, puisque l'expérience est inédite



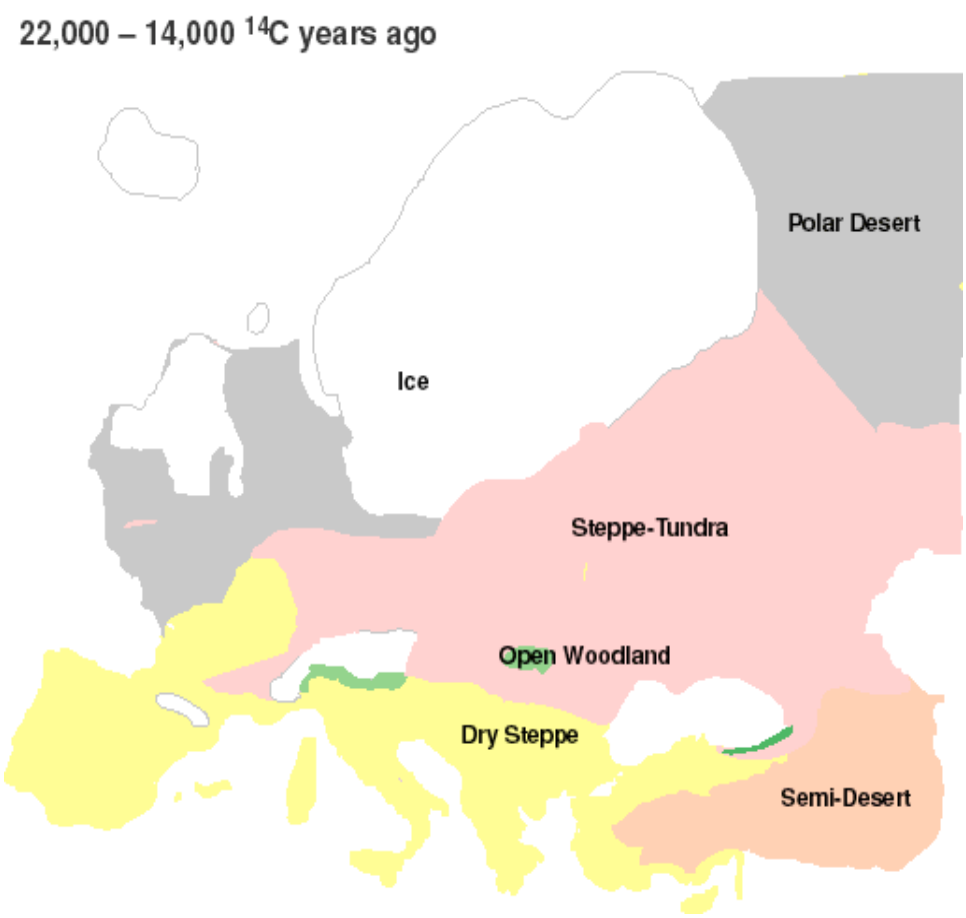


Emissions cumulées de CO_2 depuis 1870 en Gt

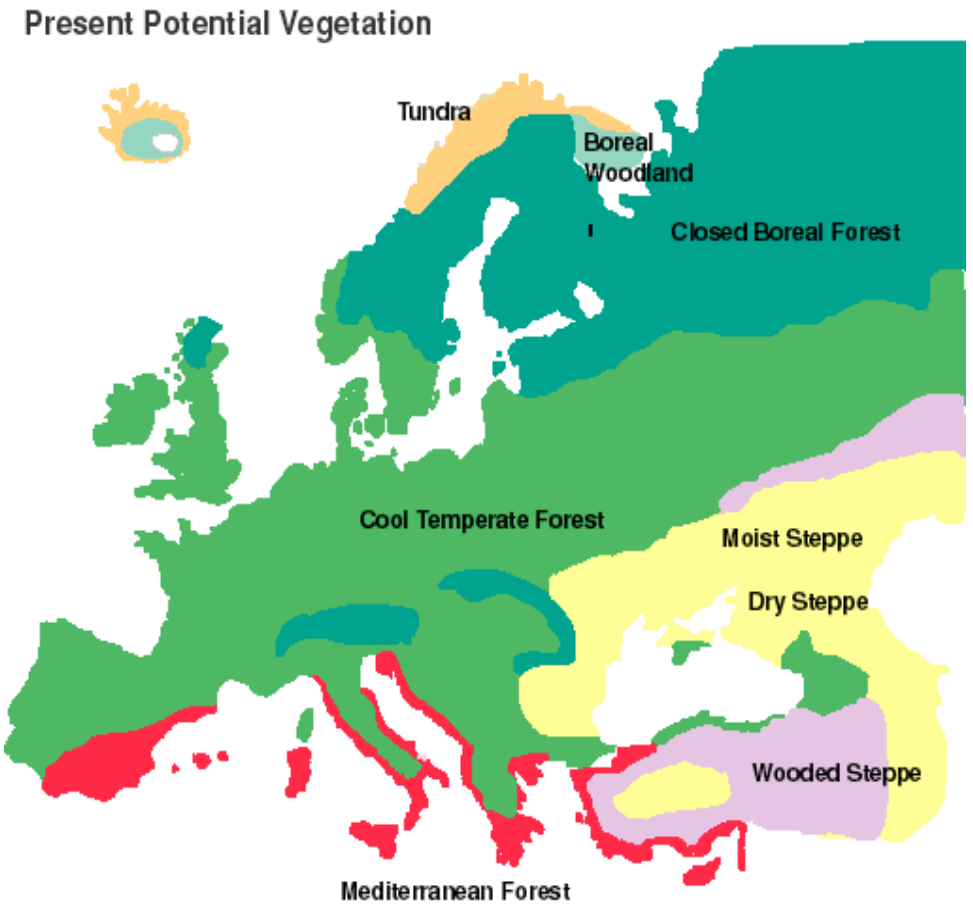
Élévation de température en 2100 en fonction du cumul émis depuis 1870. IPCC, 2015

+5°C, c'est un changement d'ère climatique

Europe il y a 20 000 ans

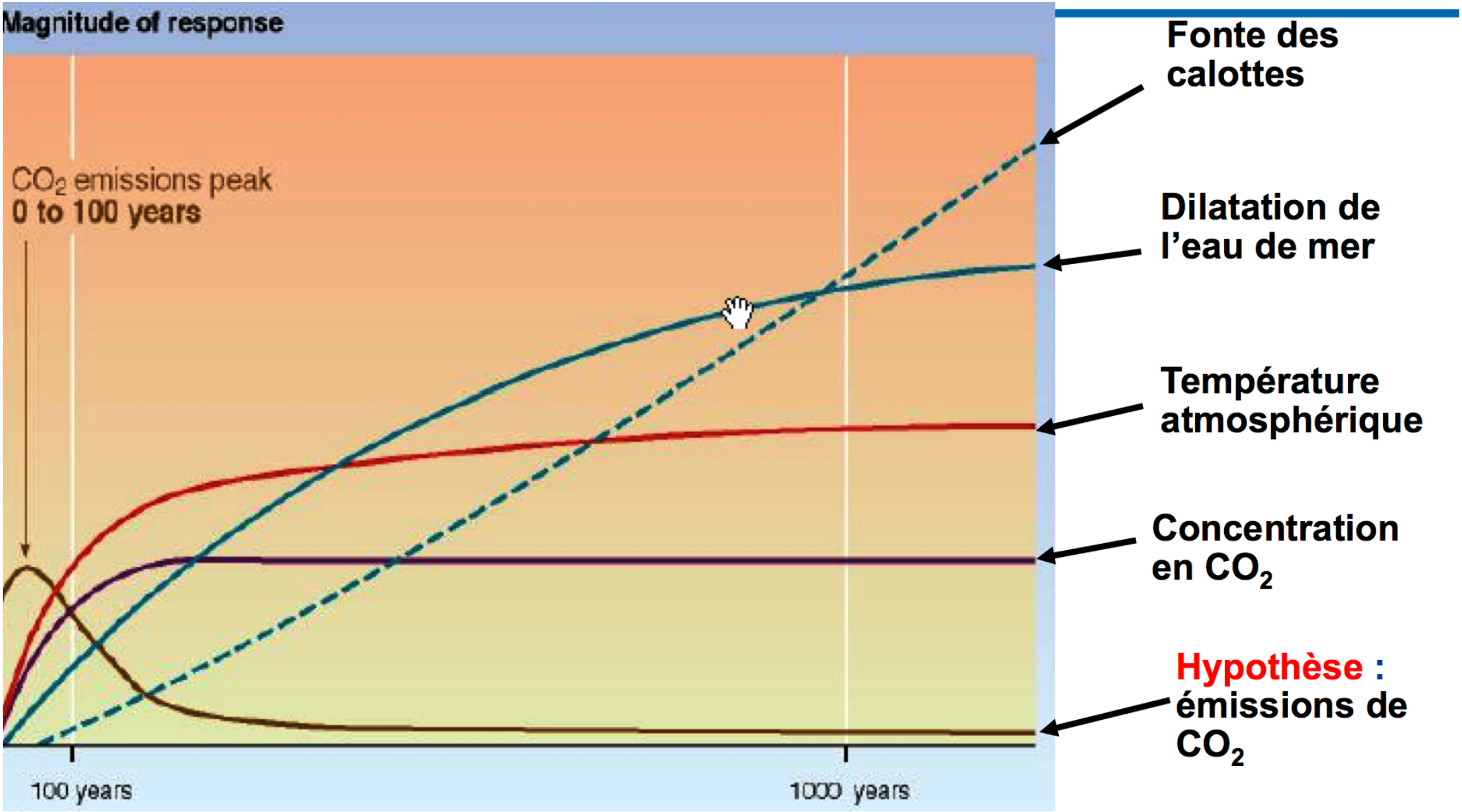


Europe aujourd'hui



+5°C

Source: Quaternary Environments Network

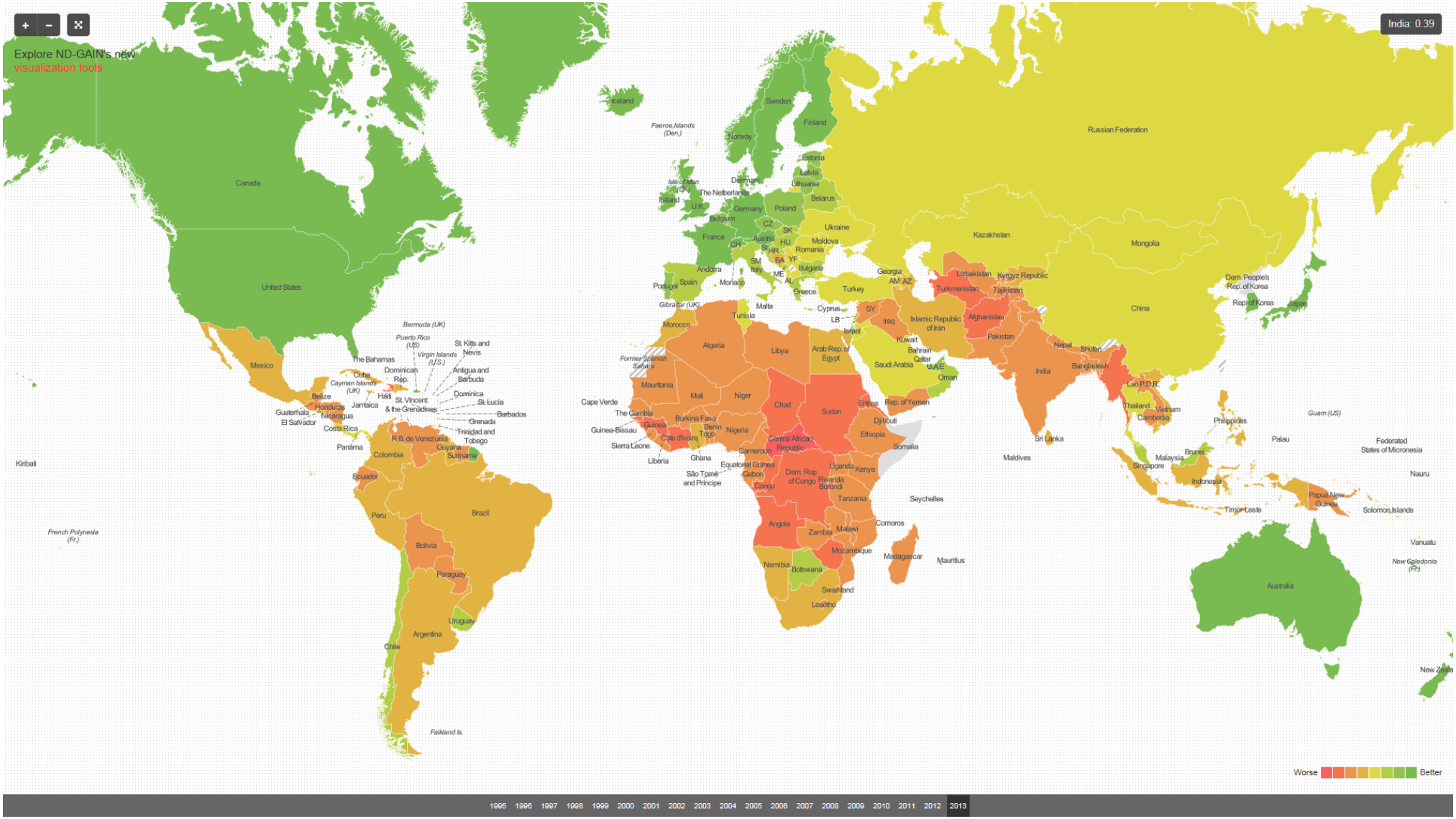


Source : Climate Change 2001, the scientific Basis, GIEC

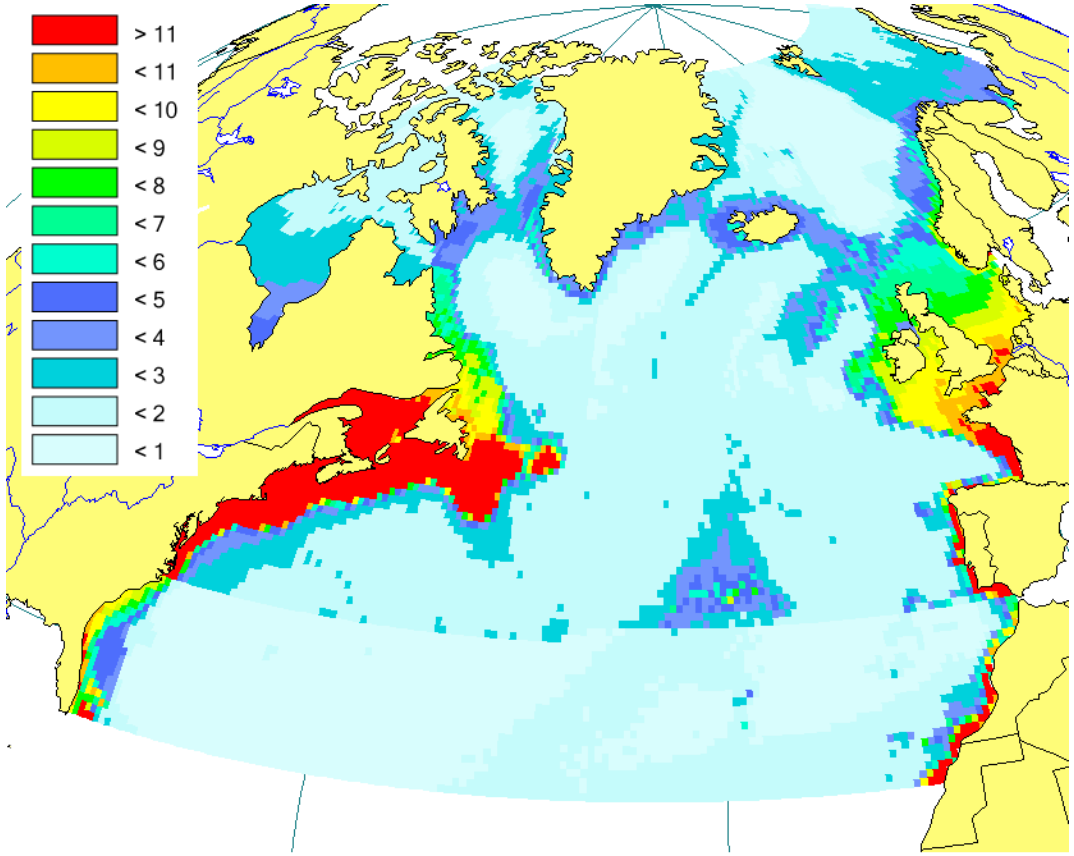
Climate Change Vulnerability Index

Source : Maplecroft 2014

Adaptation capability



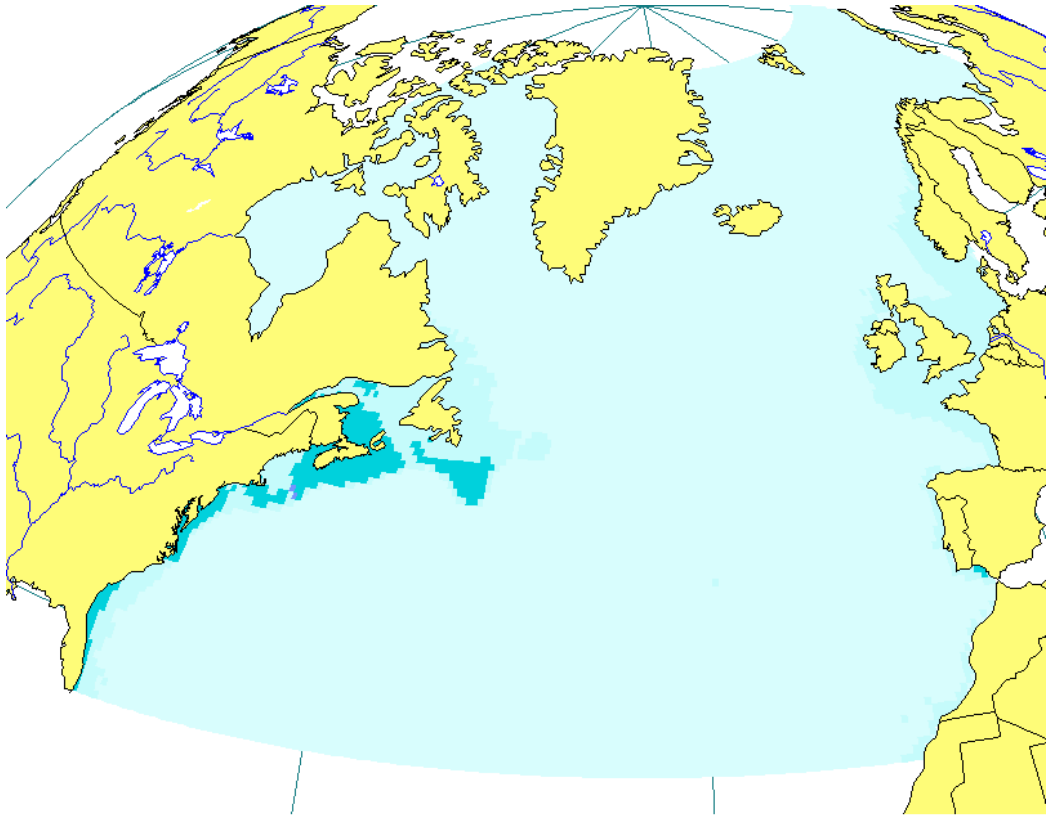
Source : GAIN Index / readiness map



Abondance des poissons Atlantique nord en 1900

Une mer sans poissons en 2050?

(Philippe Cury, Calmann-Lévy, 2008)



Abondance des poissons Atlantique nord en 2000

Christensen et al. (Fish & Fisheries, 2003)

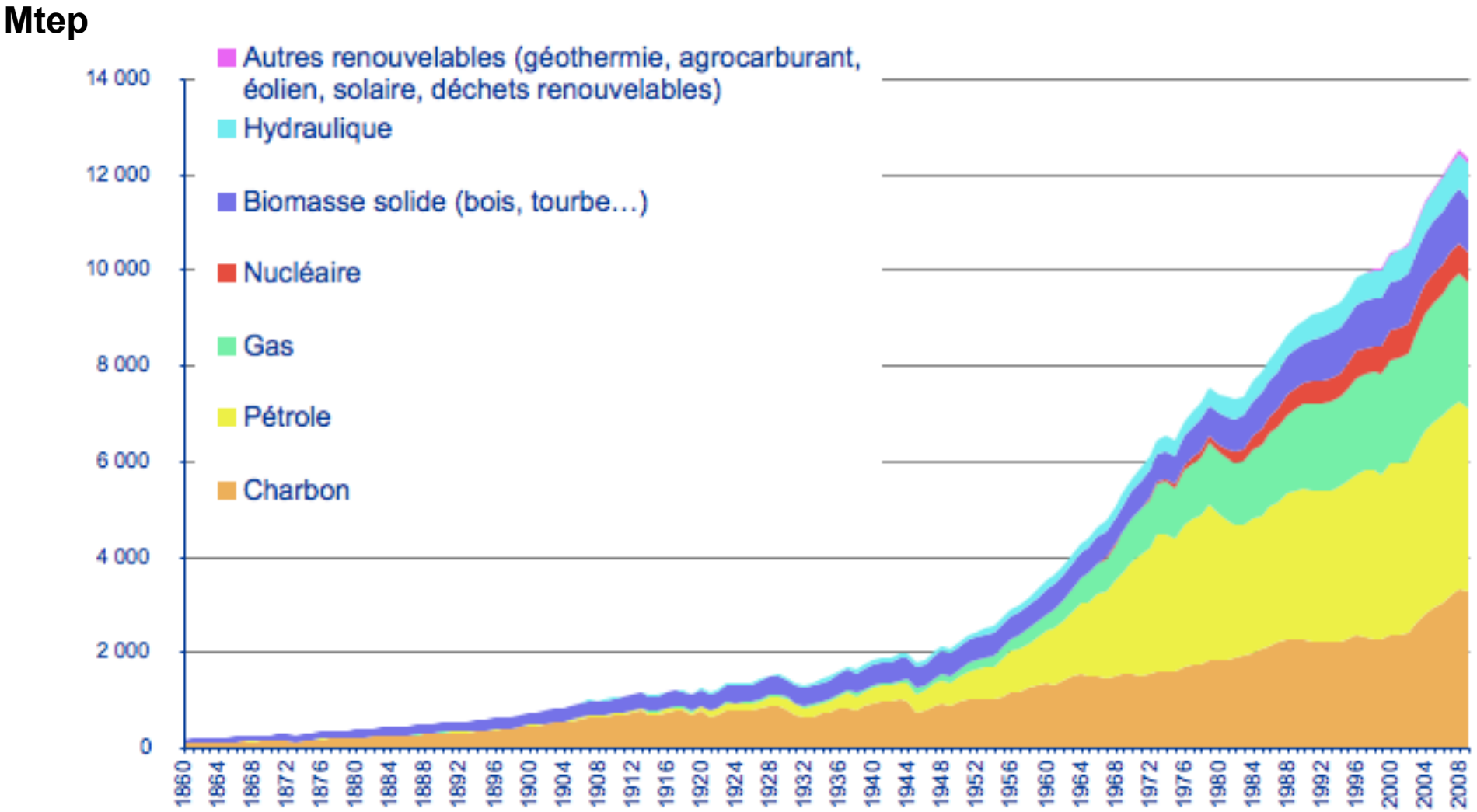
Profit as a mean, not a goal

« This does not mean being opposed to any technological innovations which can bring about an improvement in the quality of life. But it does mean that profit cannot be the sole criterion to be taken into account, and that, when significant new information comes to light, a reassessment should be made, with the involvement of all interested parties. The outcome may be a decision not to proceed with a given project, to modify it or to consider alternative proposals. » (187)

- II. The role of Energy.

World consumption of primary energy
since 1850

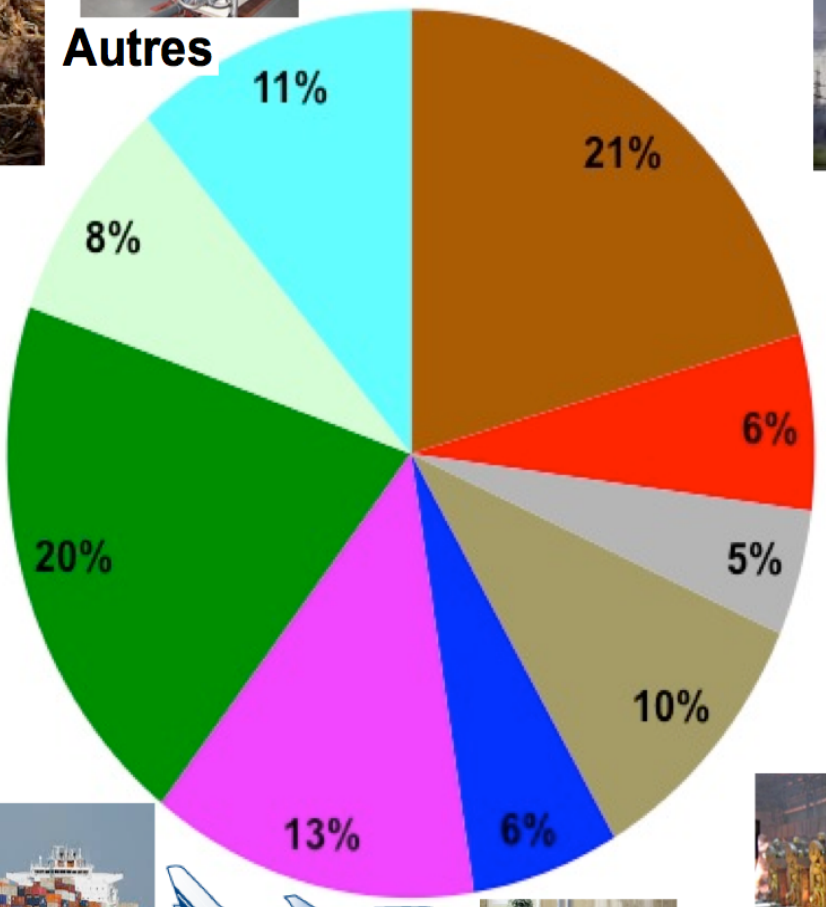
Consommation mondiale d'énergie primaire depuis 1850



Déforestation

Autres

Centrales à charbon



Centrales électriques gaz/oil

Agriculture

Ciment

≈ 4%

≈ 4%

Transports

≈ 3%

≈ 2%

Bâtiments

Reste de l'industrie

Breakdown of world GHG emissions in 2014. Jancovici, on various data.

Why should we focus on the link growth/energy?

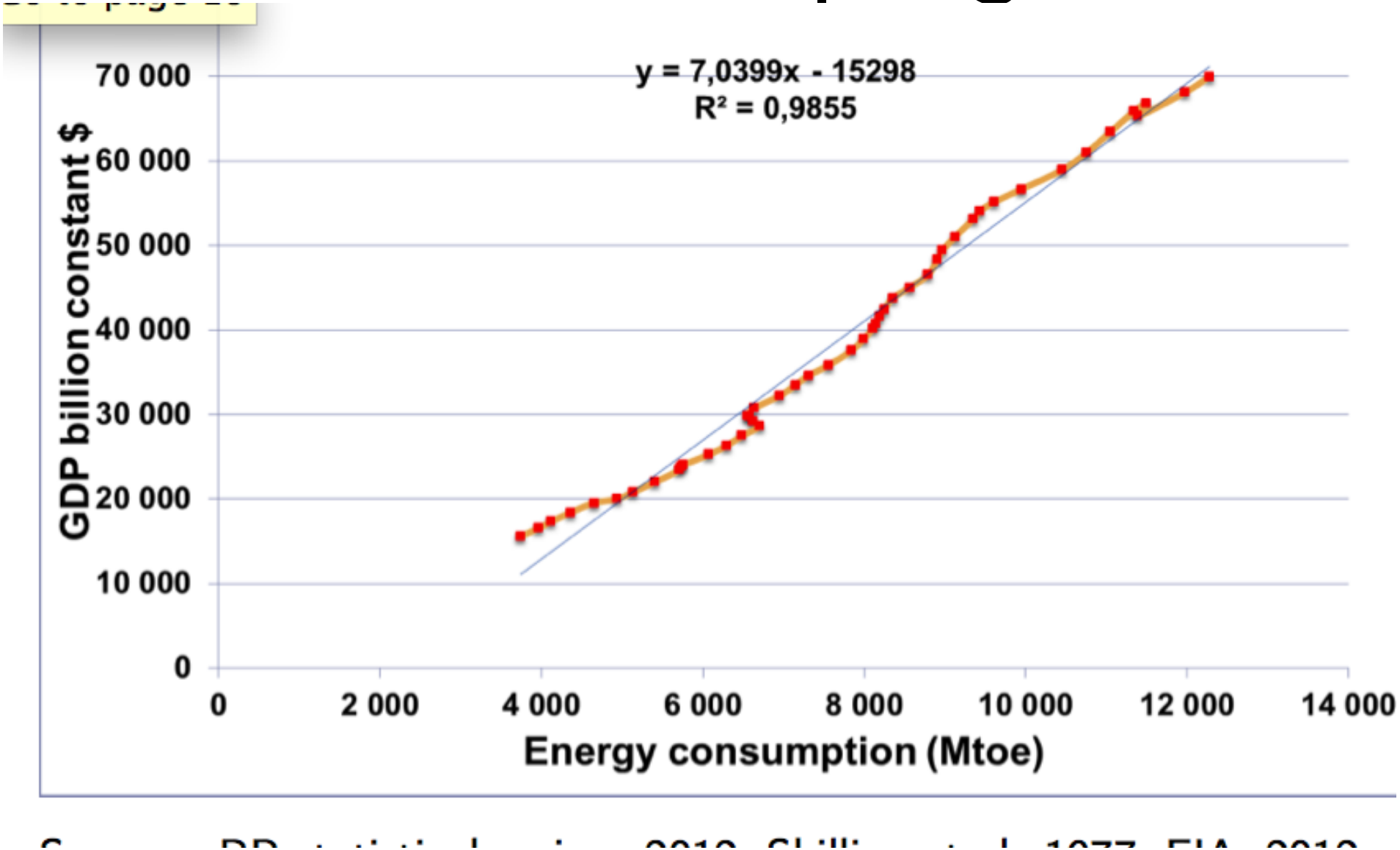
- Kaya's equation:

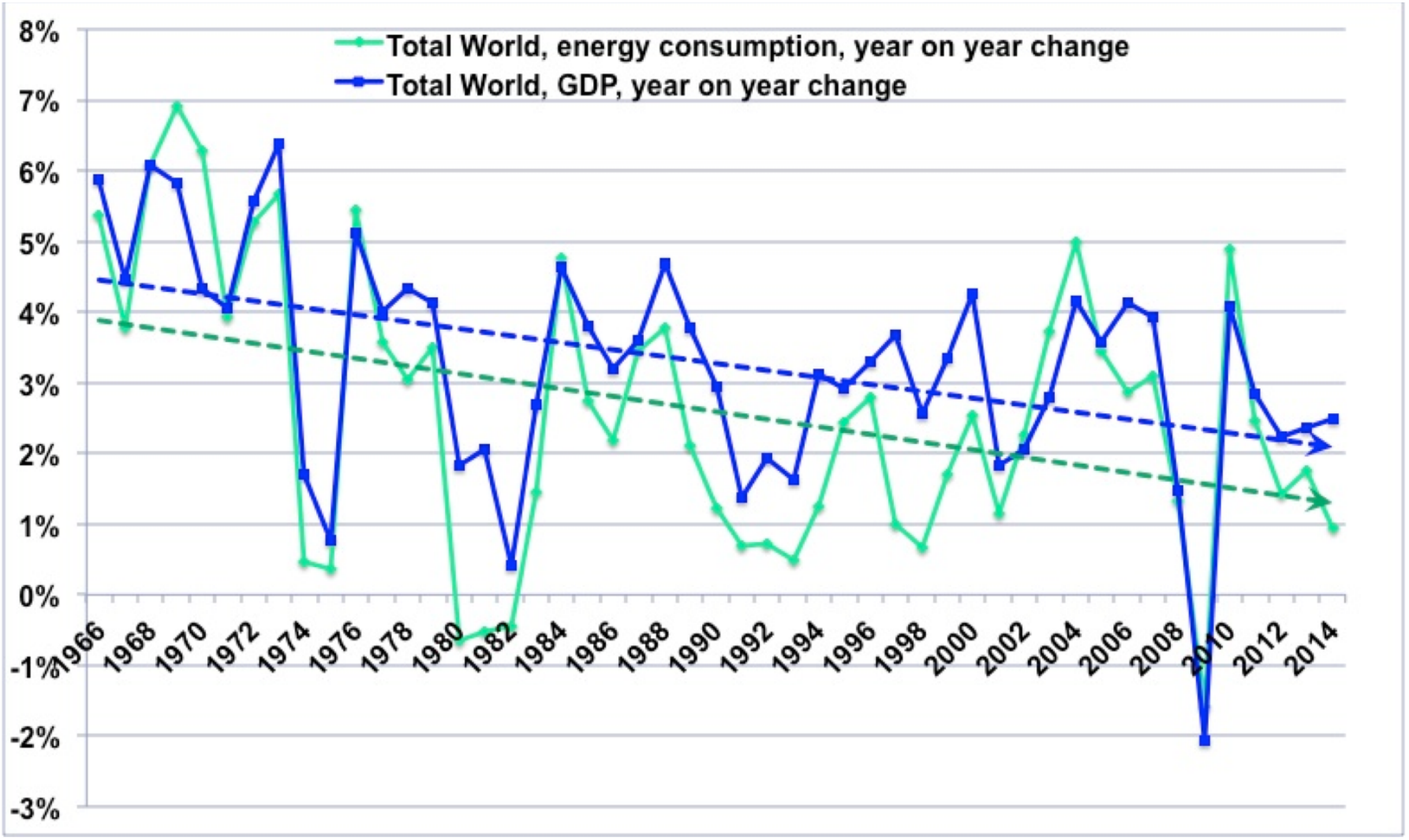
$$\frac{Y_t}{N_t} = \frac{E_t}{N_t} \times \frac{Y_t}{E_t}, \qquad (1)$$

$$\Delta \ln \frac{Y_t}{N_t} = \Delta \ln \frac{E_t}{N_t} + \Delta \ln \frac{Y_t}{E_t} \qquad (2)$$

- World average 1965 - 1981: 2.38% = 1.6% + 0.78%
- World average 1981 - 2013: 1.86% = **0.5%** + 1.36%
- Japan 2000 - 2012: **0% = 0% + 0%**

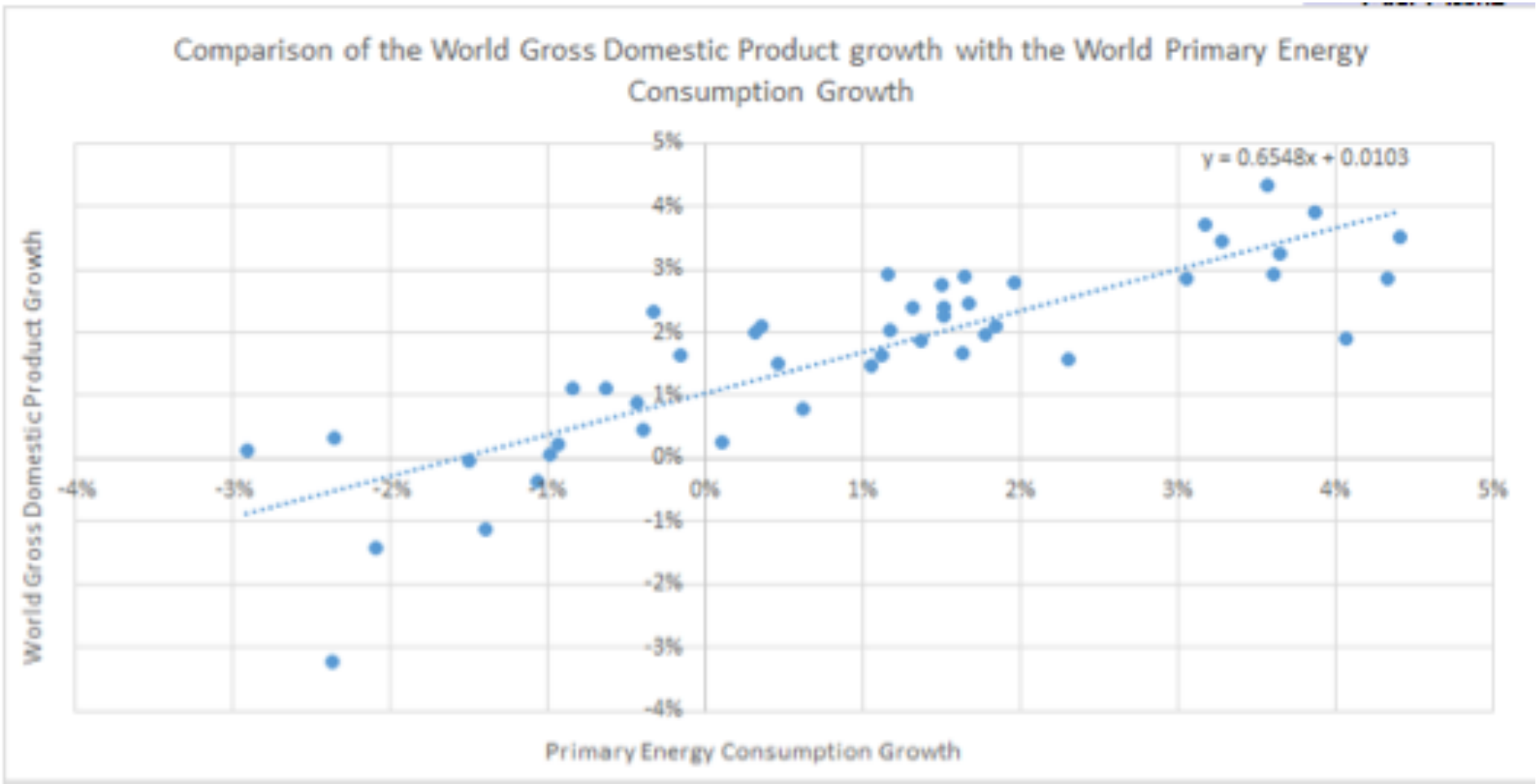
Decoupling?


y = 7,0399x - 15298
R² = 0,9855
GDP billion constant $
70 000
60 000
50 000
40 000
30 000
20 000
10 000
0
0
2 000
4 000
6 000
8 000
10 000
12 000
14 000
Energy consumption (Mtoe)

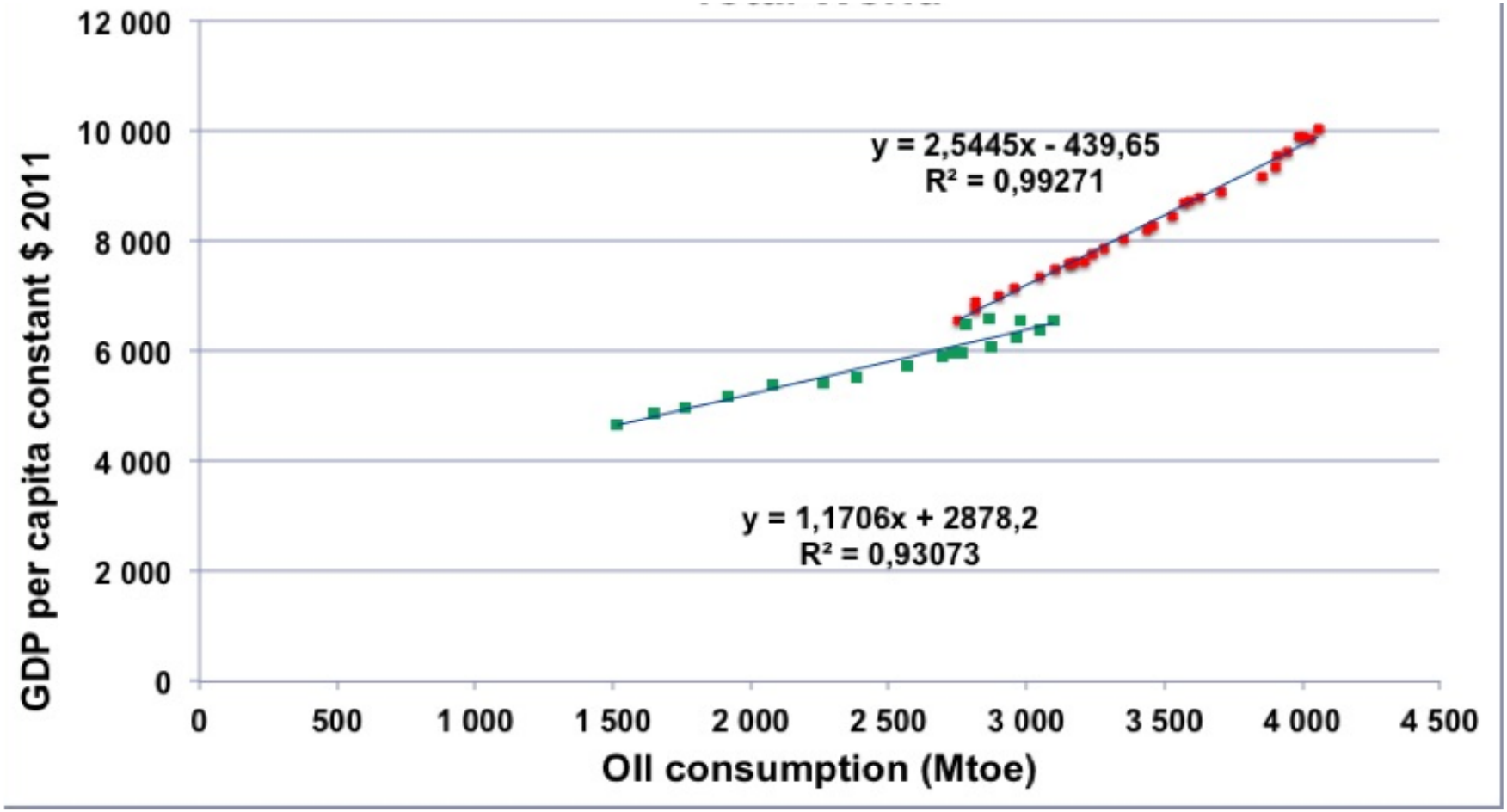


Variation de la consommation d'énergie (en vert) et du PIB en dollars constants (en bleu), pour le monde. **Données World Bank pour le PIB et BP stat pour l'énergie**

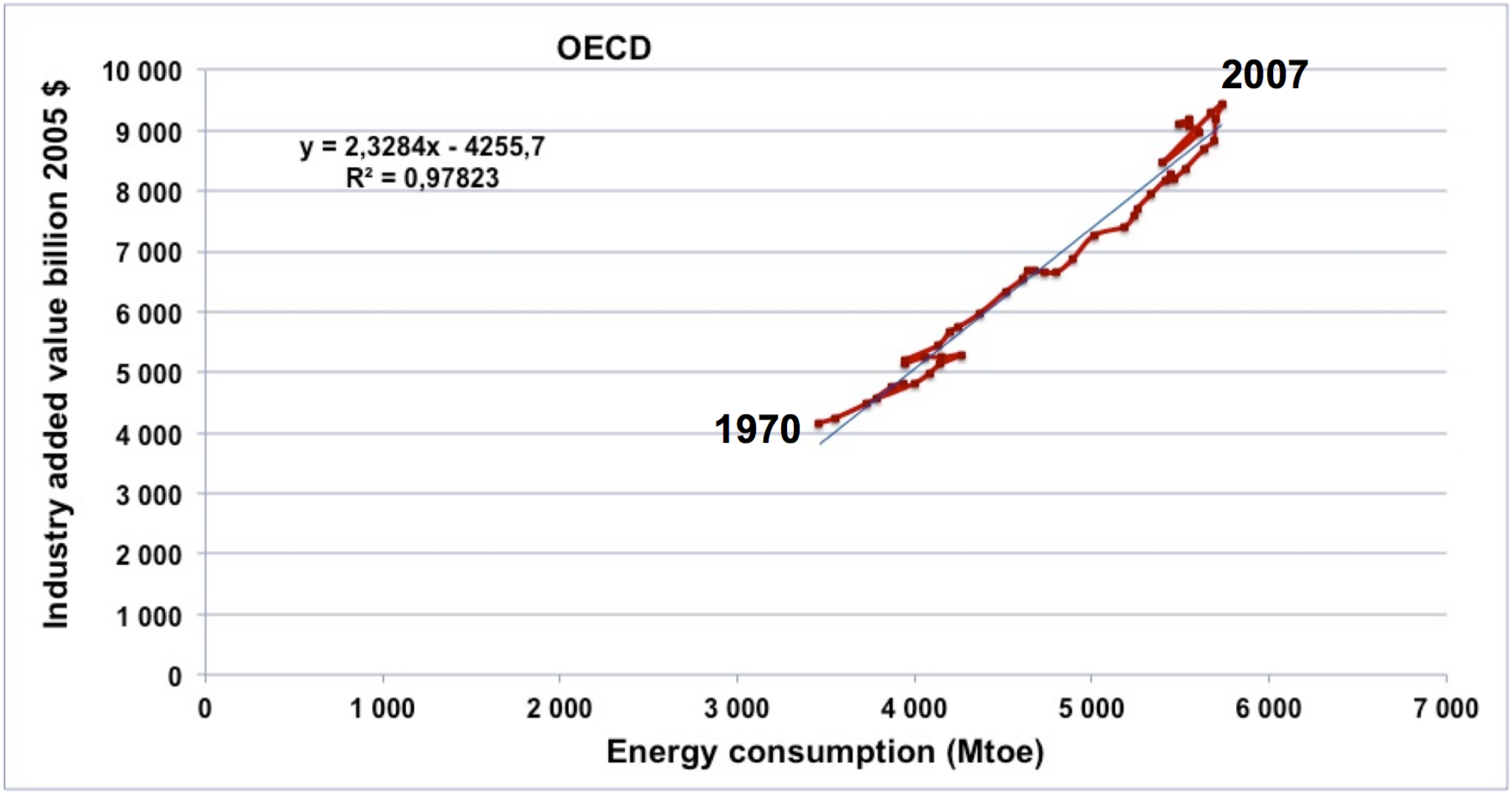
GDP elasticity wrt Primary Energy? Around 60%...



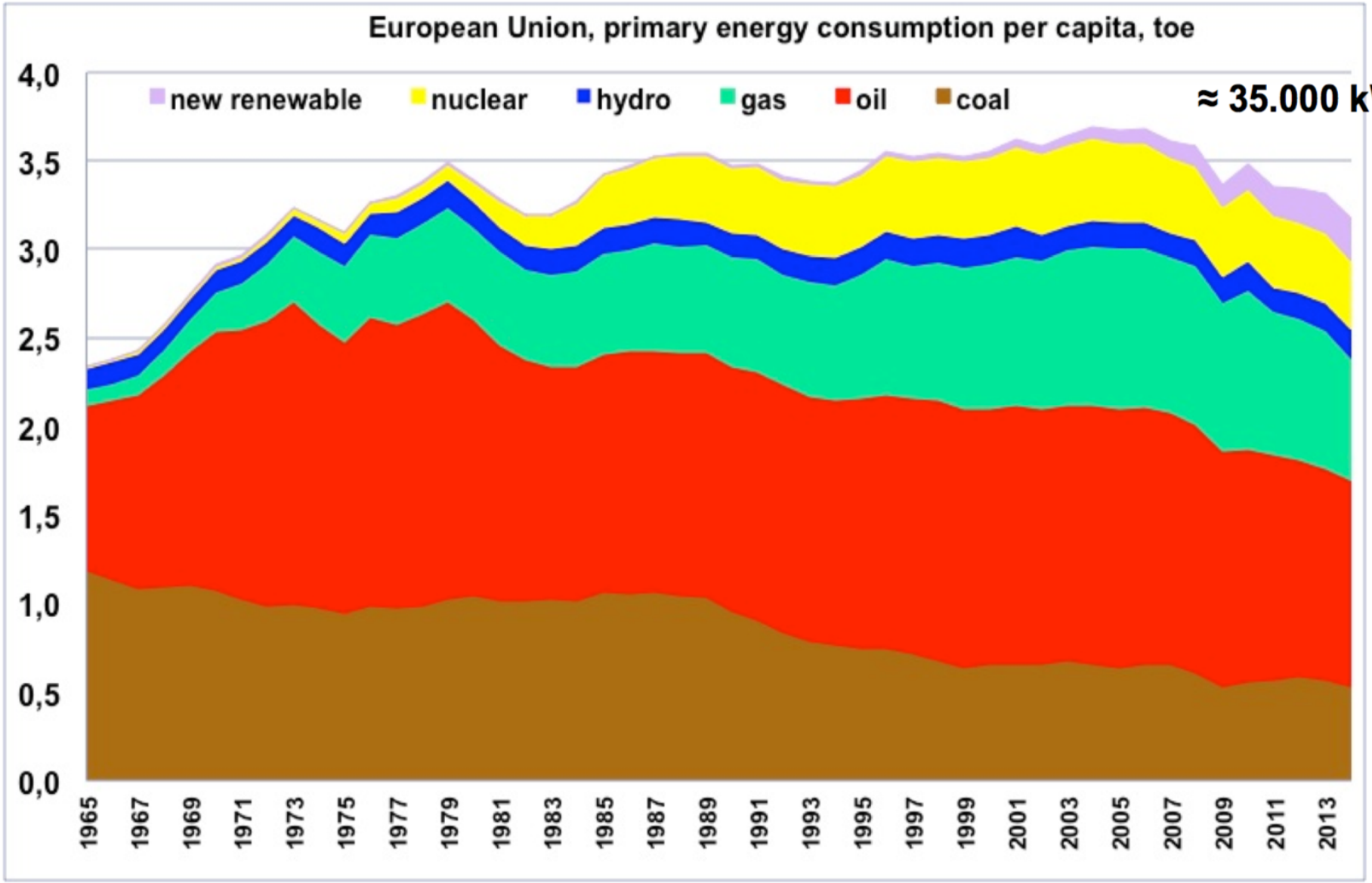
Decoupling? (II)



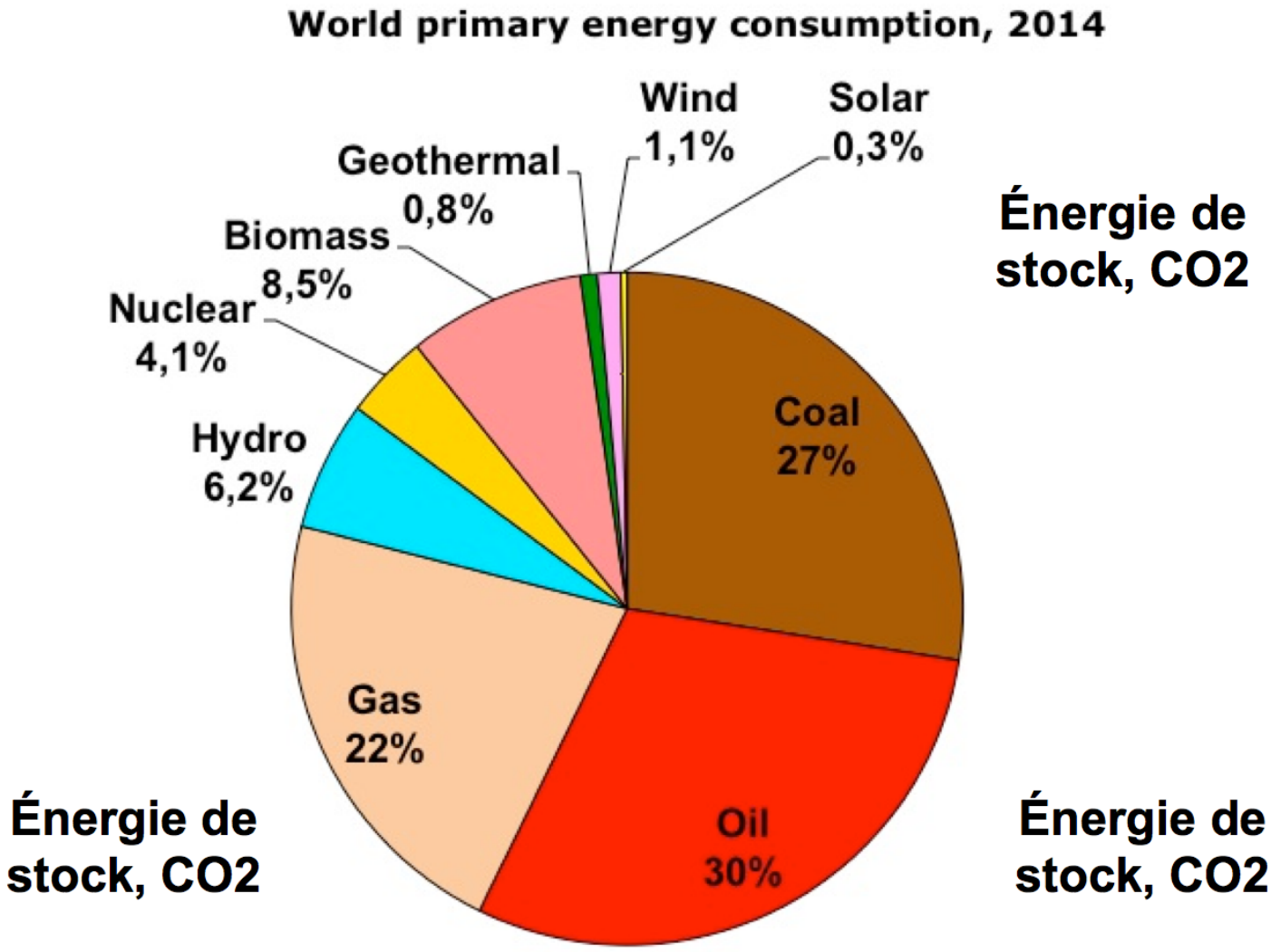
Source : BP statistical review, 2012, Shilling et al. 1977, EIA, 2012,



Energie consommée (en abscisse) et production industrielle en dollars constants (ordonnée) pour l'OCDE, de 1970 à 2013. Données World Bank & BP Statistical Review

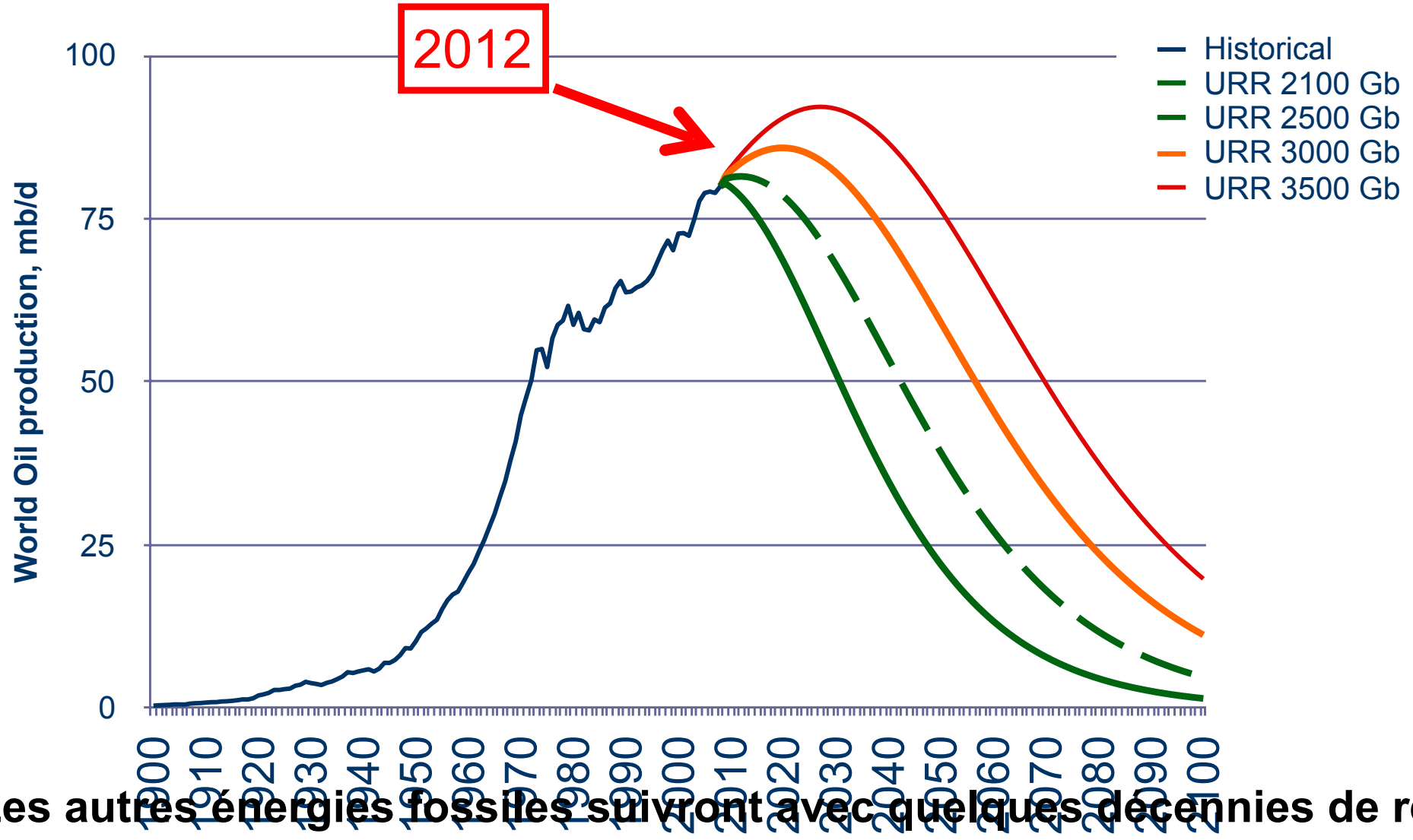


Consommation d'énergie par personne dans l'Union depuis 1965. Données BP Statistical Review, 2015



Répartition de la consommation d'énergie primaire dans le monde en 2014. Jancovici, sur données BP Statistical Review

Peak oil? Soon?



Les autres énergies fossiles suivront avec quelques décennies de retard

Source : Carbone 4 From Historical IEA, AIE, E&L, BP ; prospective The Shift Project with Hubbert extrapolation

- Some disturbing questions:
- - why this reduction of growth since the 80s?
- Secular stagnation (Larry Summers, Bob Gordon).

The danger of the win- win approach

« It is not enough to balance, in the medium term, the protection of nature with financial gain, or the preservation of the environment with progress. Halfway measures simply delay the inevitable disaster. Put simply, it is a matter of redefining our notion of progress. A technological and economic development which does not leave in its wake a better world and an integrally higher quality of life cannot be considered progress. Frequently, in fact, people's quality of life actually diminishes – by the deterioration of the environment, the low quality of food or the depletion of resources – in the midst of economic growth. In this context, … the social and environmental responsibility of businesses often gets reduced to a series of marketing and image-enhancing measures » (194)

- III. How to escape from a disaster?

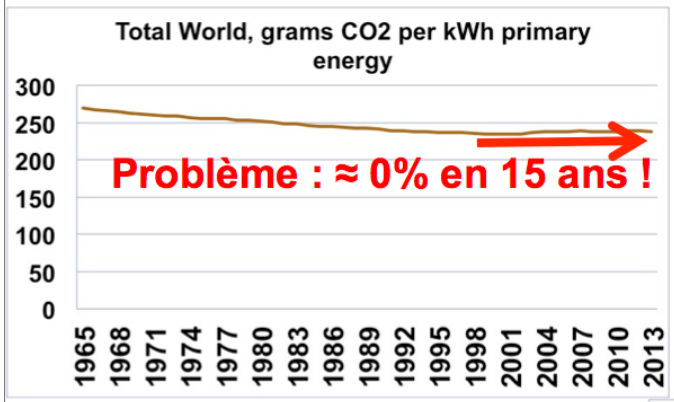
L'équation de Kaya :

A diviser par 3 d'ici 2050…

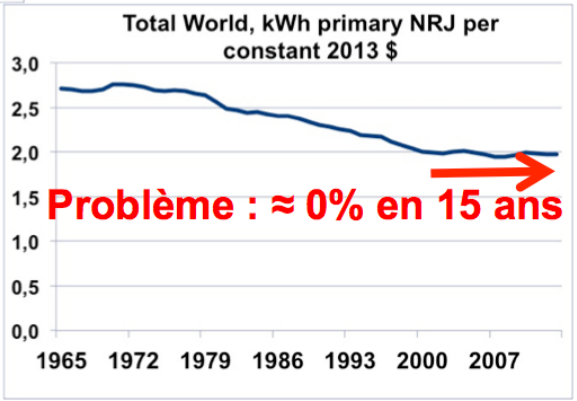
↘ et le sera !

$$CO_2 = \frac{CO_2}{TEP} * \frac{TEP}{PIB} * \frac{PIB}{POP} * POP$$

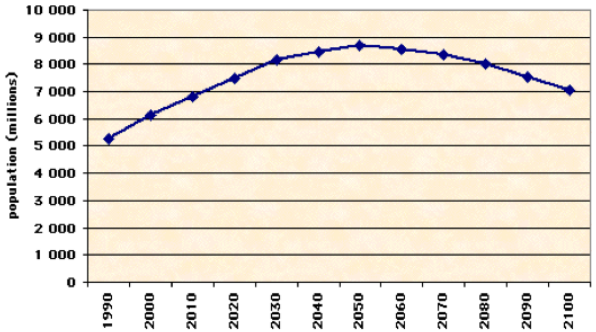
Emissions de gaz carbonique	=	Contenu en gaz carbonique de l'énergie	*	Intensité énergétique de l'économie	*	Production par personne	* Population



Magic technique N°2 :
↘ CO_2 par kWh = nuke, ENR, CCS & charbon vers gaz



Magic technique N°1 :
↘ NRJ par $ de PIB



+ 25% d'ici 2050 ?

+ 2% par an = x 2 en 36 ans ; + 4% par an = x 4 en 36 ans !!!

Science without **conscience**…

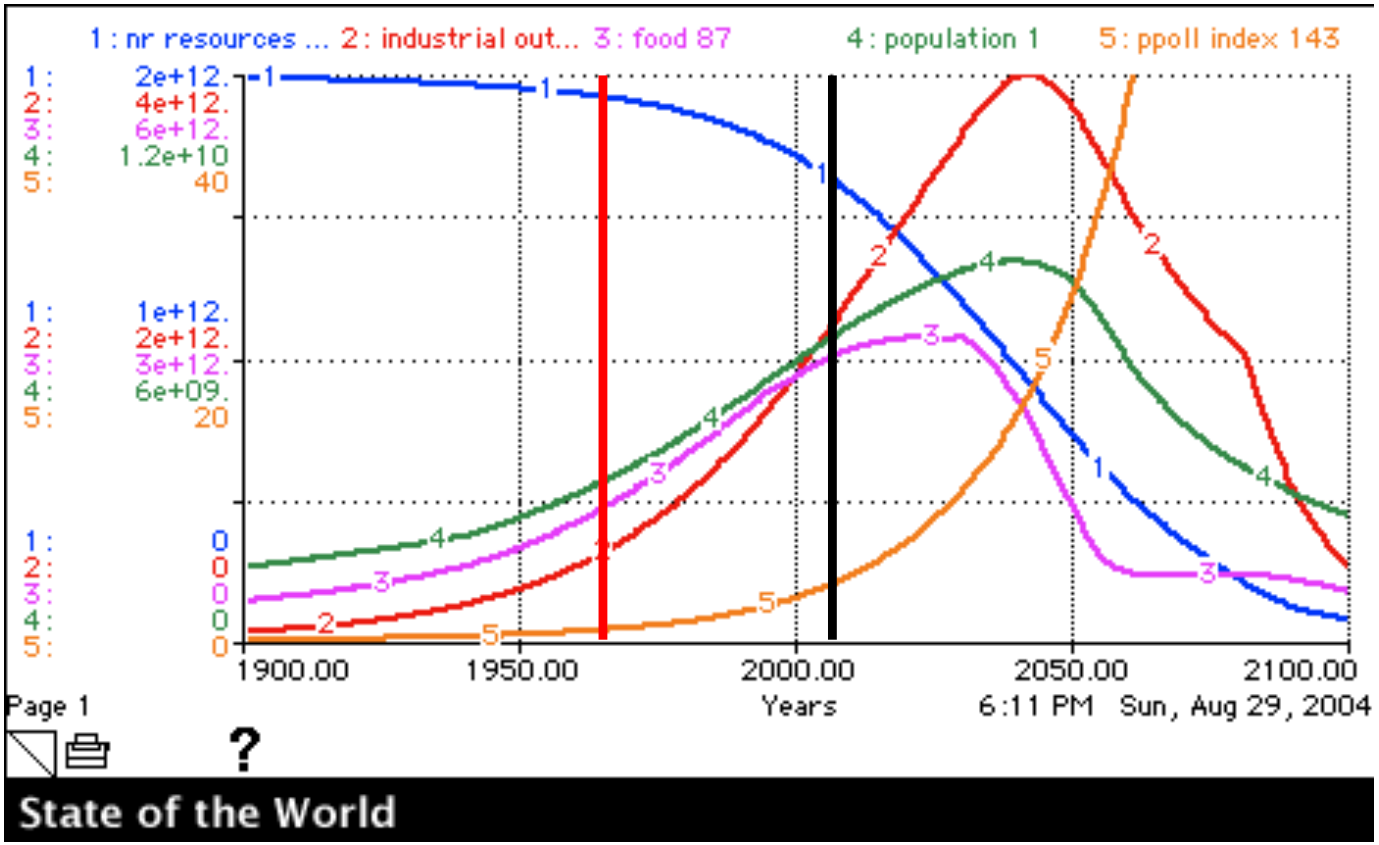
« Our immense technological development has not been accompanied by a development in human responsibility, values and conscience. Each age tends to have only a meagre awareness of its own limitations. It is possible that we do not grasp the gravity of the challenges now before us. "The risk is growing day by day that man will not use his power as he should"; in effect, "power is never considered in terms of the responsibility of choice which is inherent in freedom" since its "only norms are taken from alleged necessity, from either utility or security". But human beings are not completely autonomous. » (105)

- Increase of sea level (Mekong).
- melting of glaciers (Tibet, Andes)
- Deserts (Sahara, Gobi, Middle-East…)
- Soil erosion
- Destruction of groundwater resources.
- Decline in soil fertility (temperature)

Food security is not ensured after 2030

Meadows (1972) has not been defeated (cf. Turner 2014)

A ce jour les projections faites dans les années 70 se confirment



Pollution

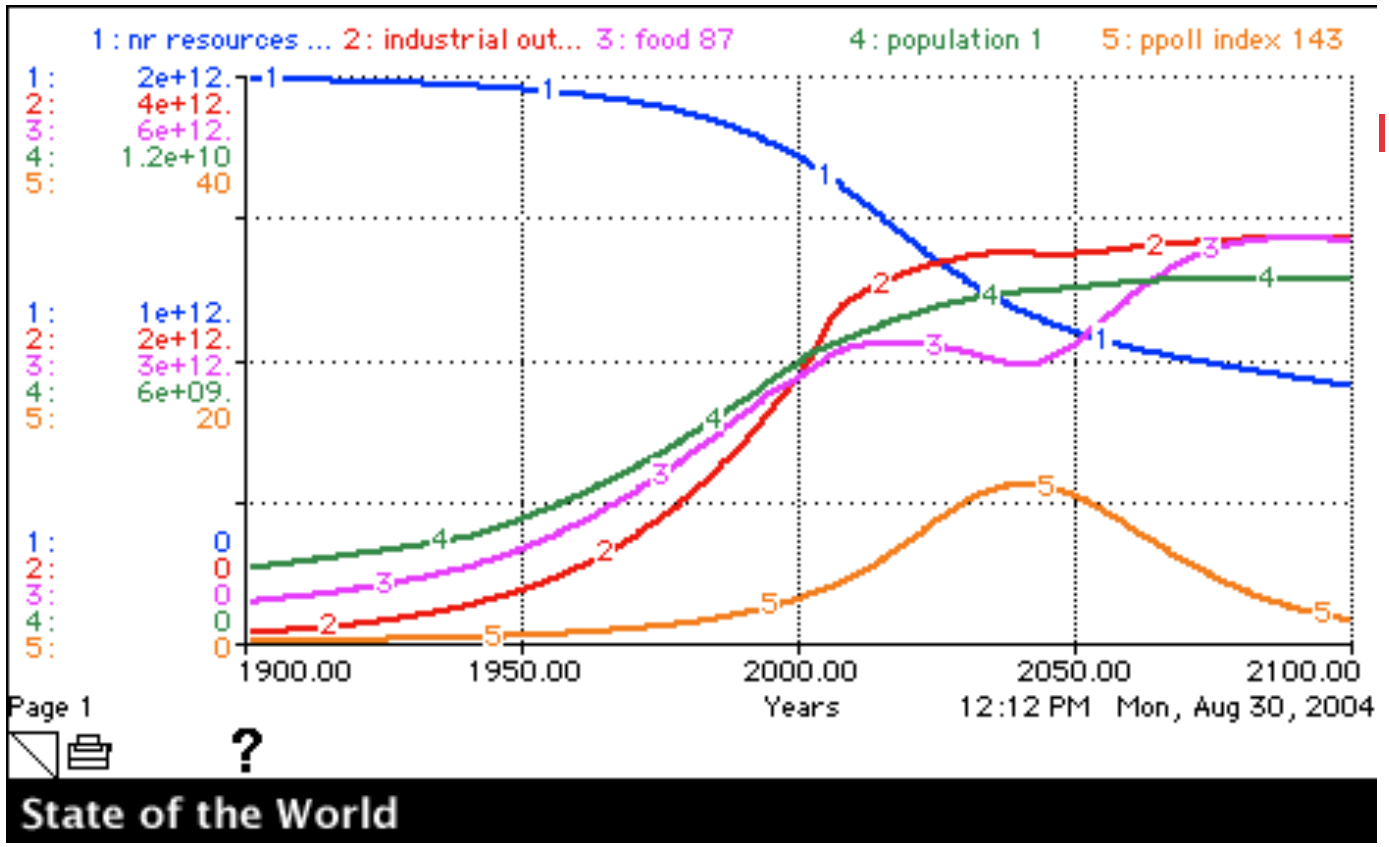
Ressources

Population

Industrial Output

Food

Meadows and the Energy shift



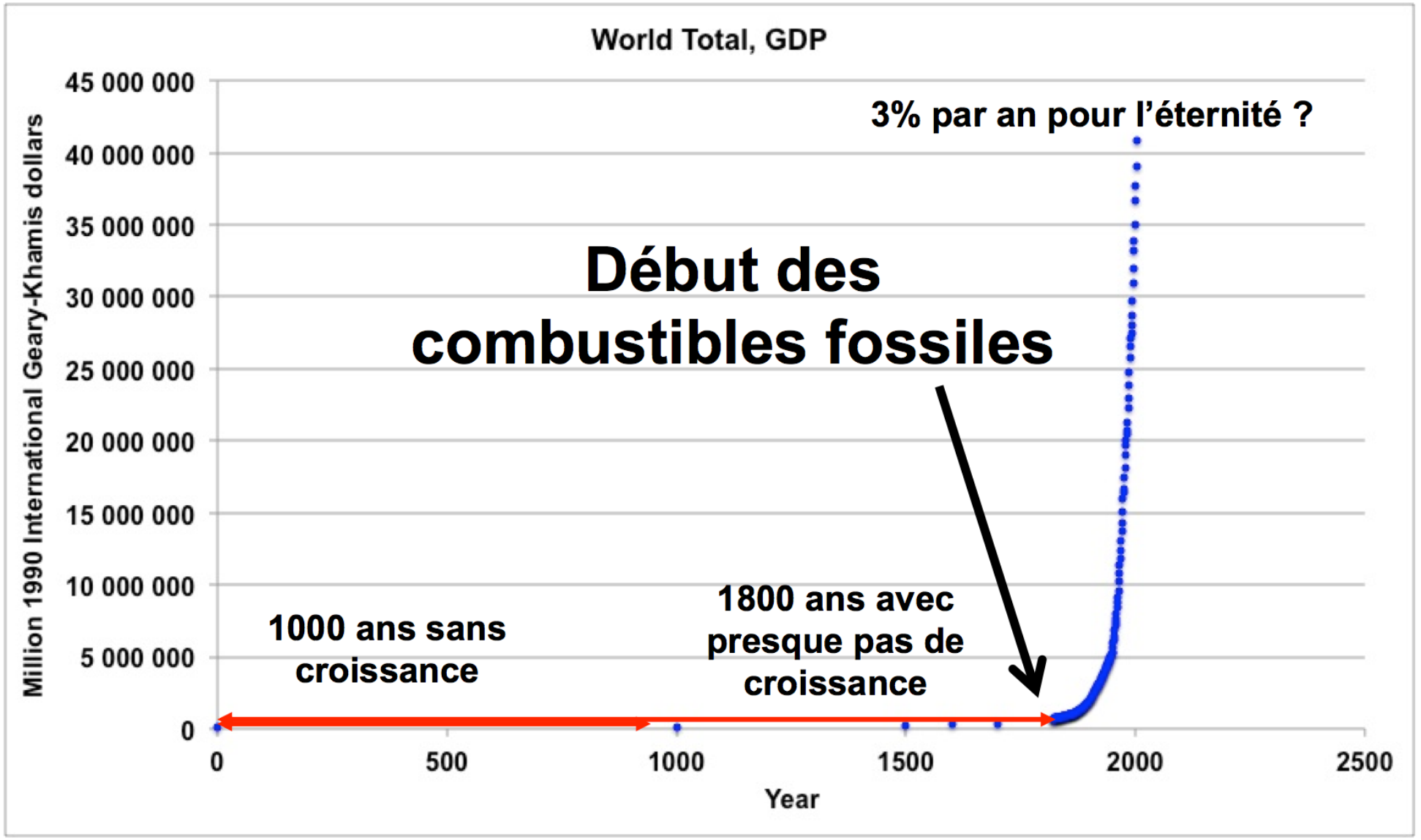
Industrial Output

Food

Population

Resources

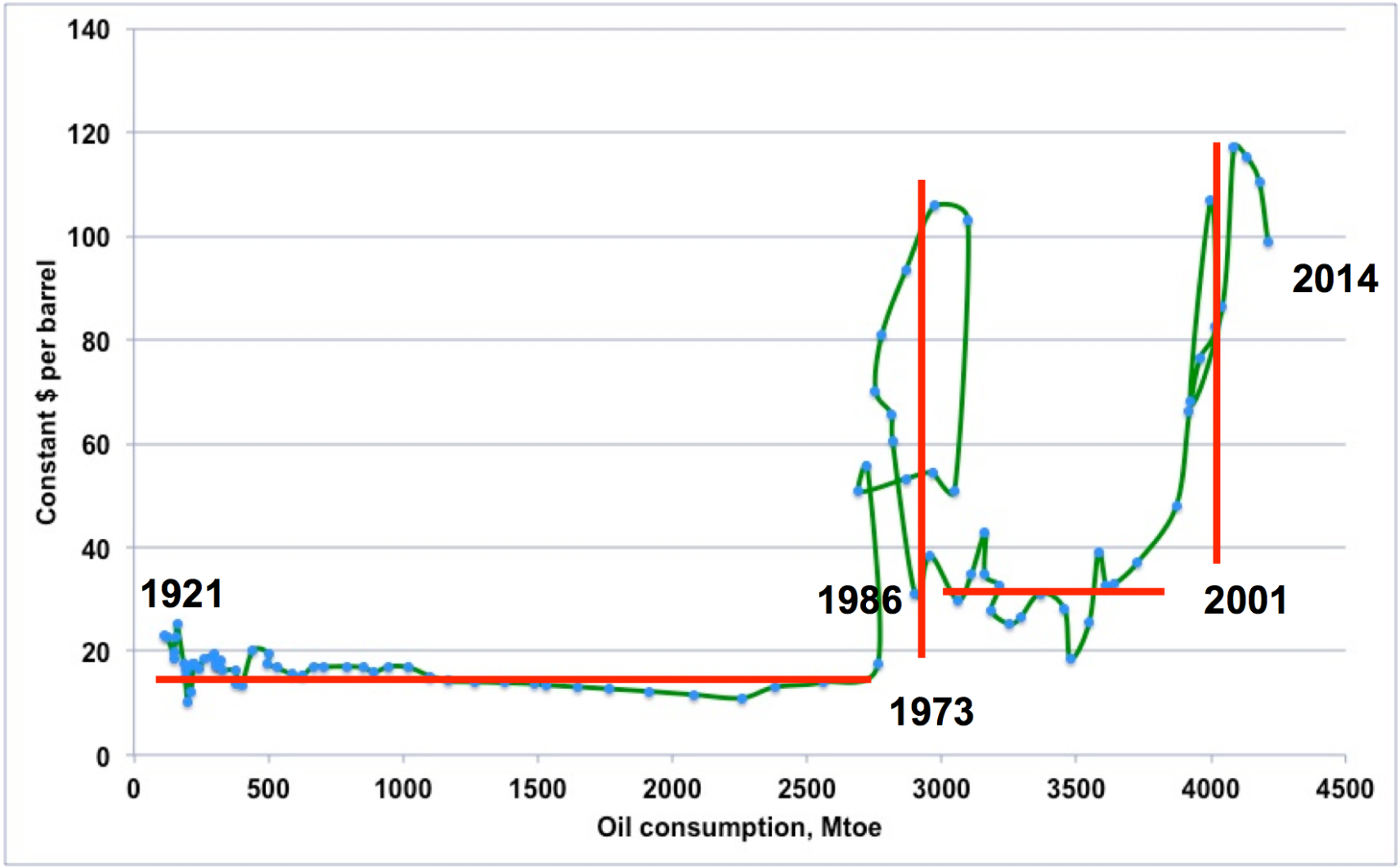
Pollution



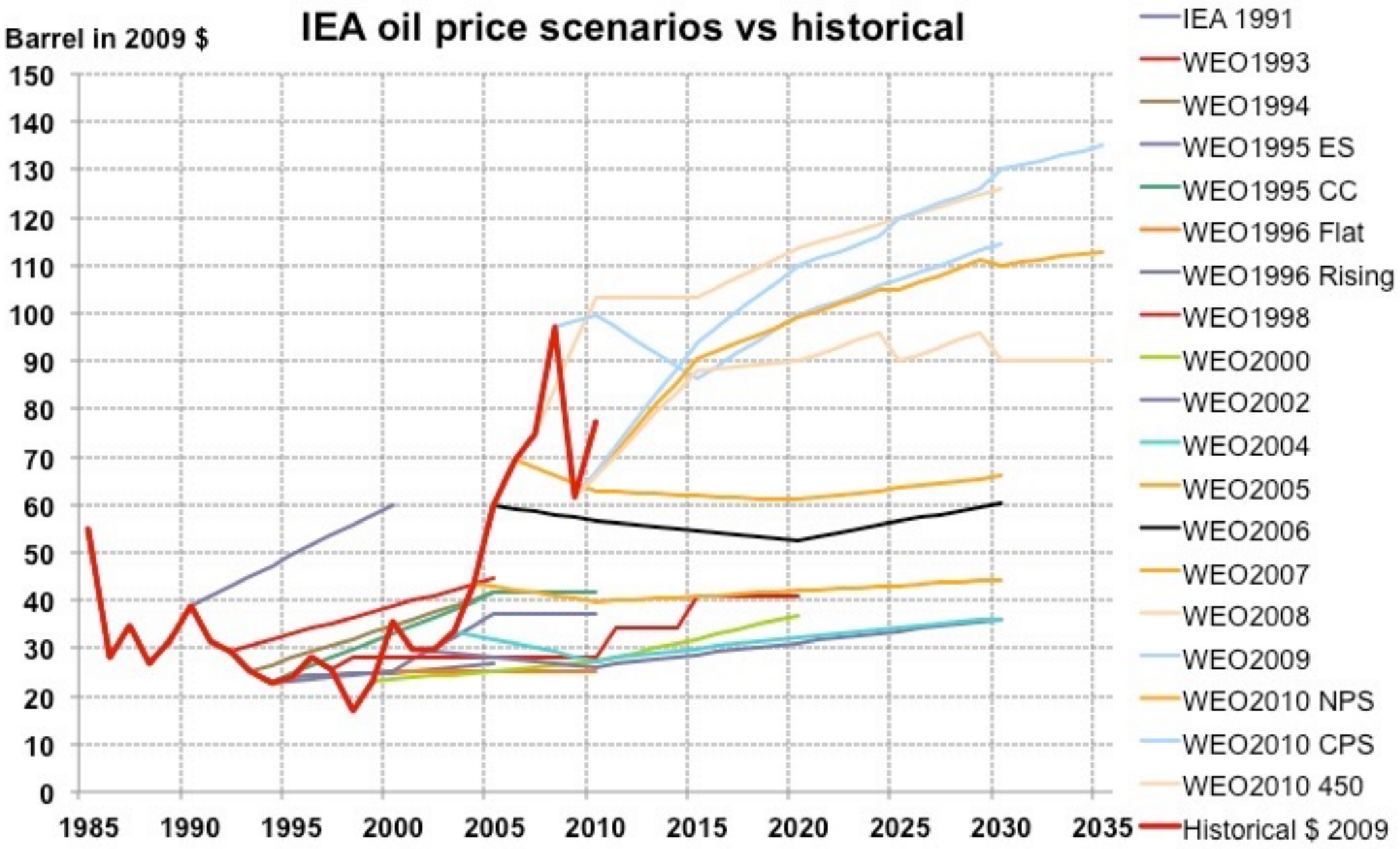
PIB mondial reconstitué de l'an 0 à 2003. Source Maddison, 2010

Culture of waste and economic shortcomings

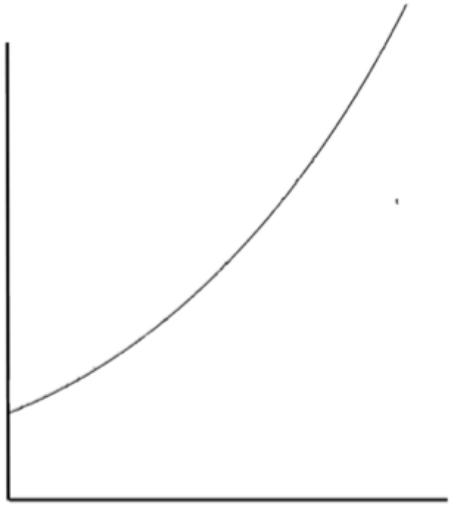
« The same kind of thinking leads to the sexual exploitation of children and abandonment of the elderly who no longer serve our interests. It is also the mindset of those who say: Let us allow the invisible forces of the market to regulate the economy, and consider their impact on society and nature as collateral damage. » (123)



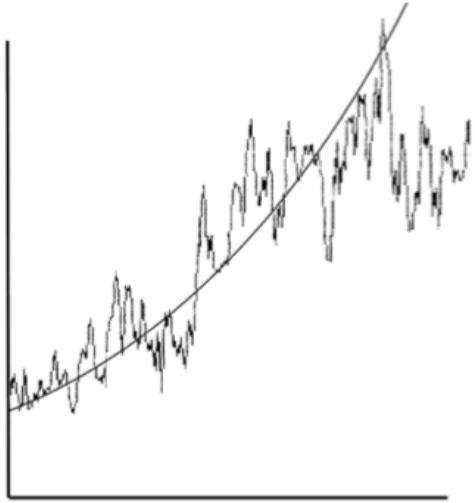
Prix du baril (en abscisse) vs. PIB en dollars constants (ordonnée) de 1960 à 2014.
Jancovici, 2014, sur données World Bank & BP Statistical Review


IEA oil price scenarios vs historical
Barrel in 2009 $
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
1985
1990
1995
2000
2005
2010
2015
2020
2025
2030
2035
IEA 1991
WEO1993
WEO1994
WEO1995 ES
WEO1995 CC
WEO1996 Flat
WEO1996 Rising
WEO1998
WEO2000
WEO2002
WEO2004
WEO2005
WEO2006
WEO2007
WEO2008
WEO2009
WEO2010 NPS
WEO2010 CPS
WEO2010 450
Historical $ 2009

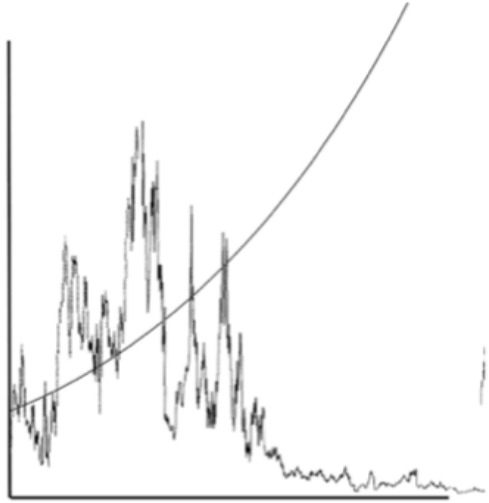
Trop de volatilité tue les prix.



Solution de $dX/dt=AX$



Solution de
$dX=AXdt + \sigma XdB$
pour σ petit

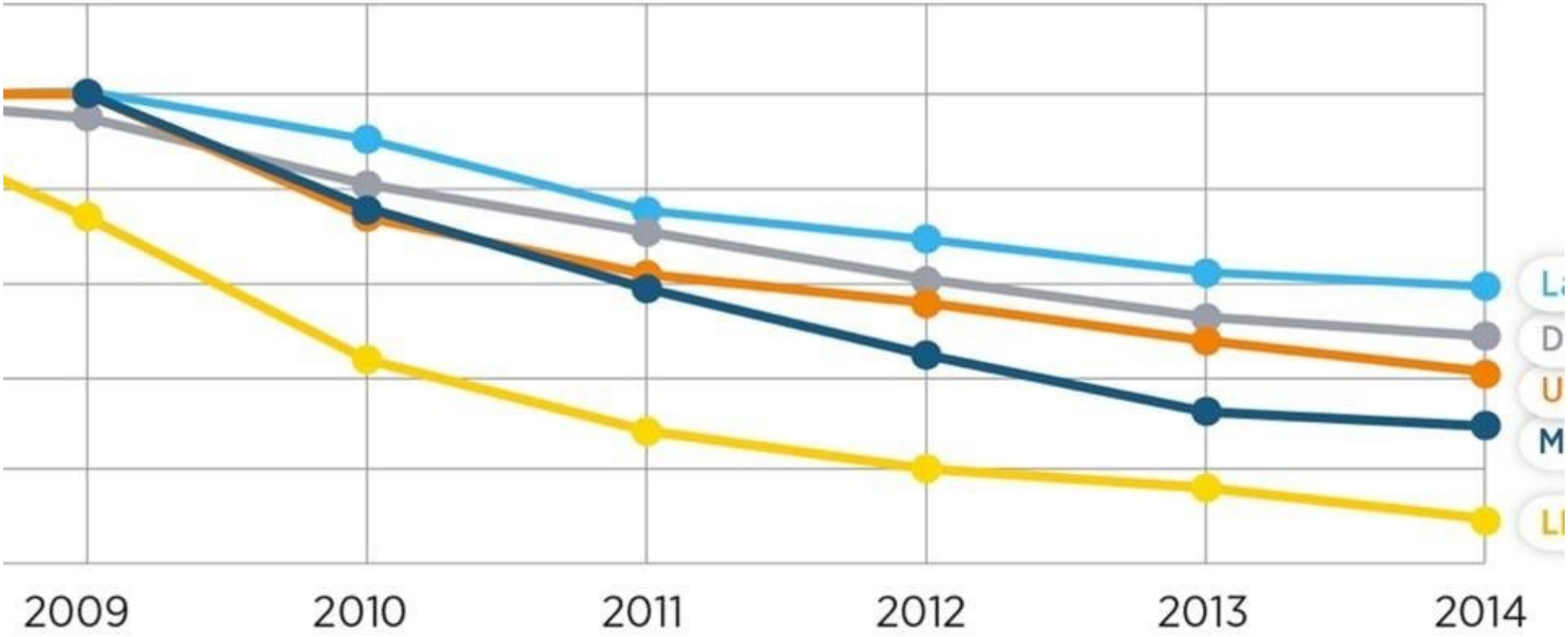


Solution de
$dX=AXdt + \sigma XdB$
pour $\sigma^2 > 2A$

Prix des commodities à long terme

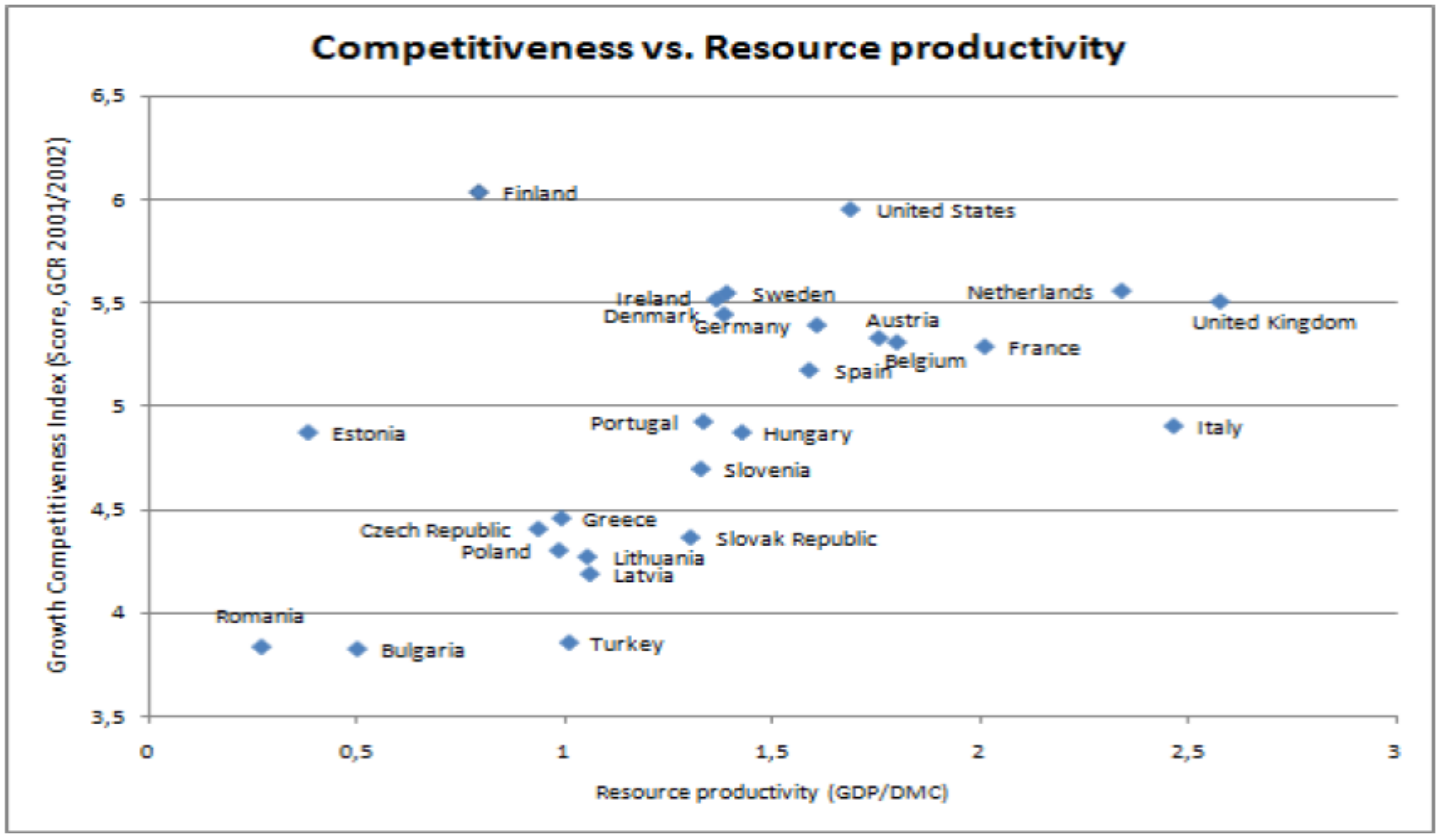
for Clean Energy Technologies

Indexed Cost Reductions Since 2008



Ressource efficiency is the key.

Figure 2-10: The relationship between the score of Global Competitiveness Index (GCI) published by the WEF and resource productivity (GDP in PPP US$ per kg DMC)



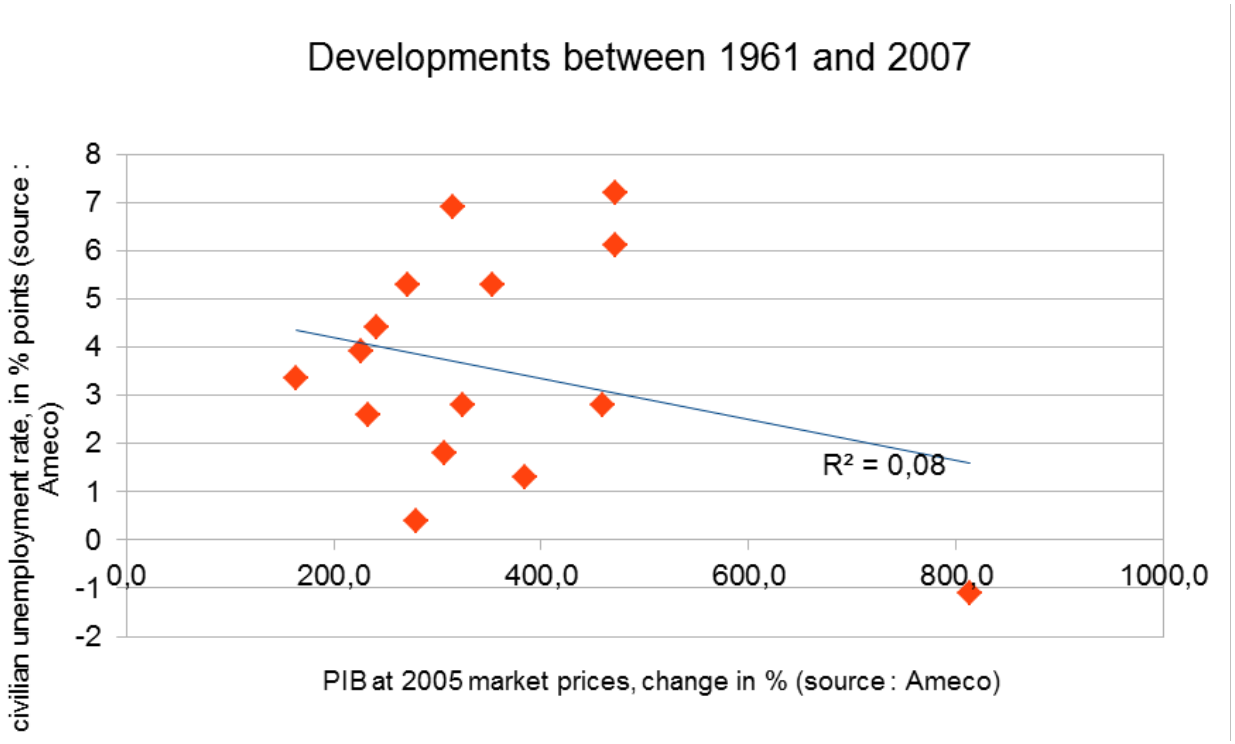
Source: DMC: EU15: 1970-2001: Eurostat/IFF (2004), 2002-2004: New Cronos; new member states plus Turkey (ACC): EEA (2003): Kiew Report Annex C; USA: WRI Database; GDP: Groningen Growth and Development Centre and the Conference Board, Total Economy Database, http://www.ggdc.ne, RP: own calculation, GCI: WEF (2002)

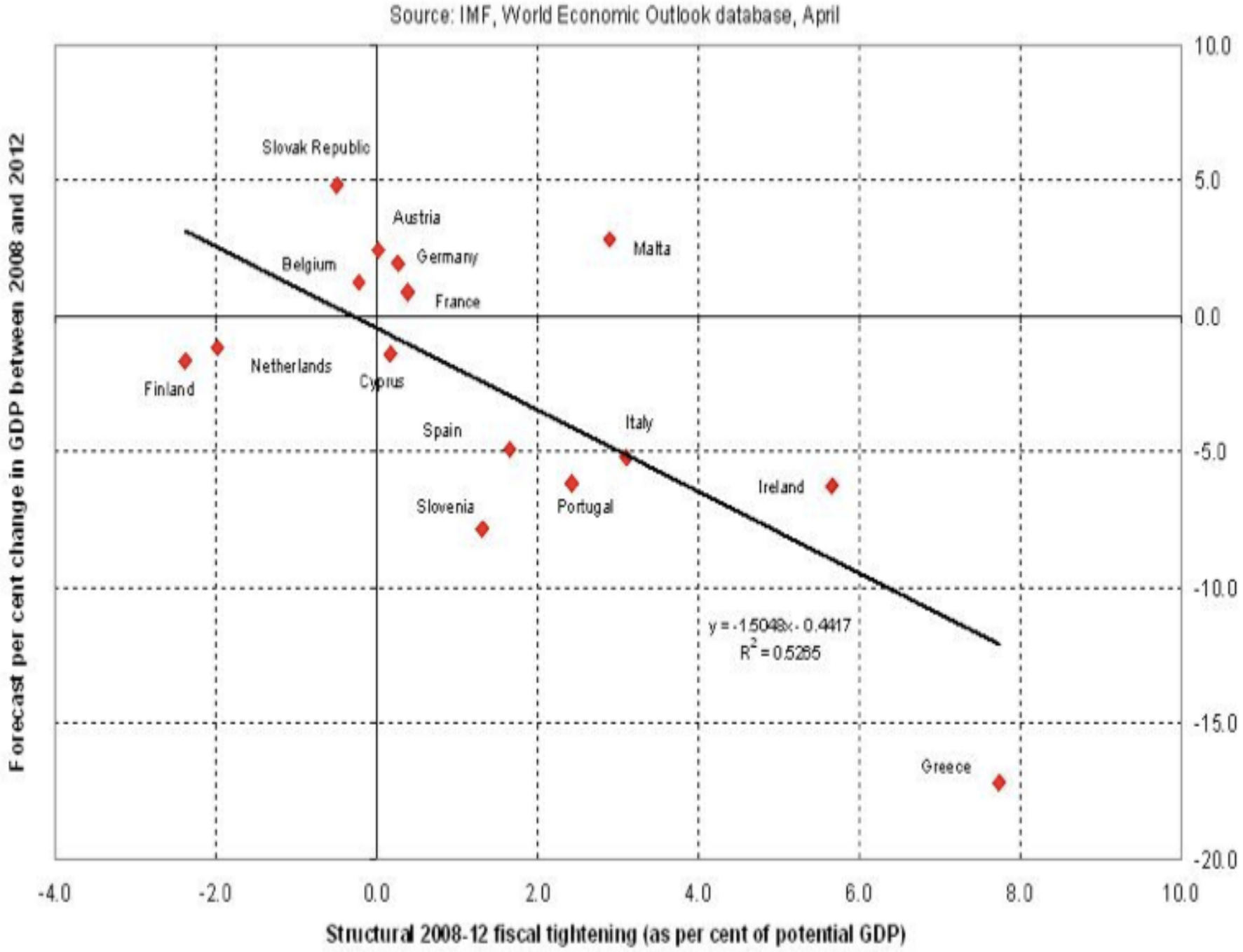
What creativity?

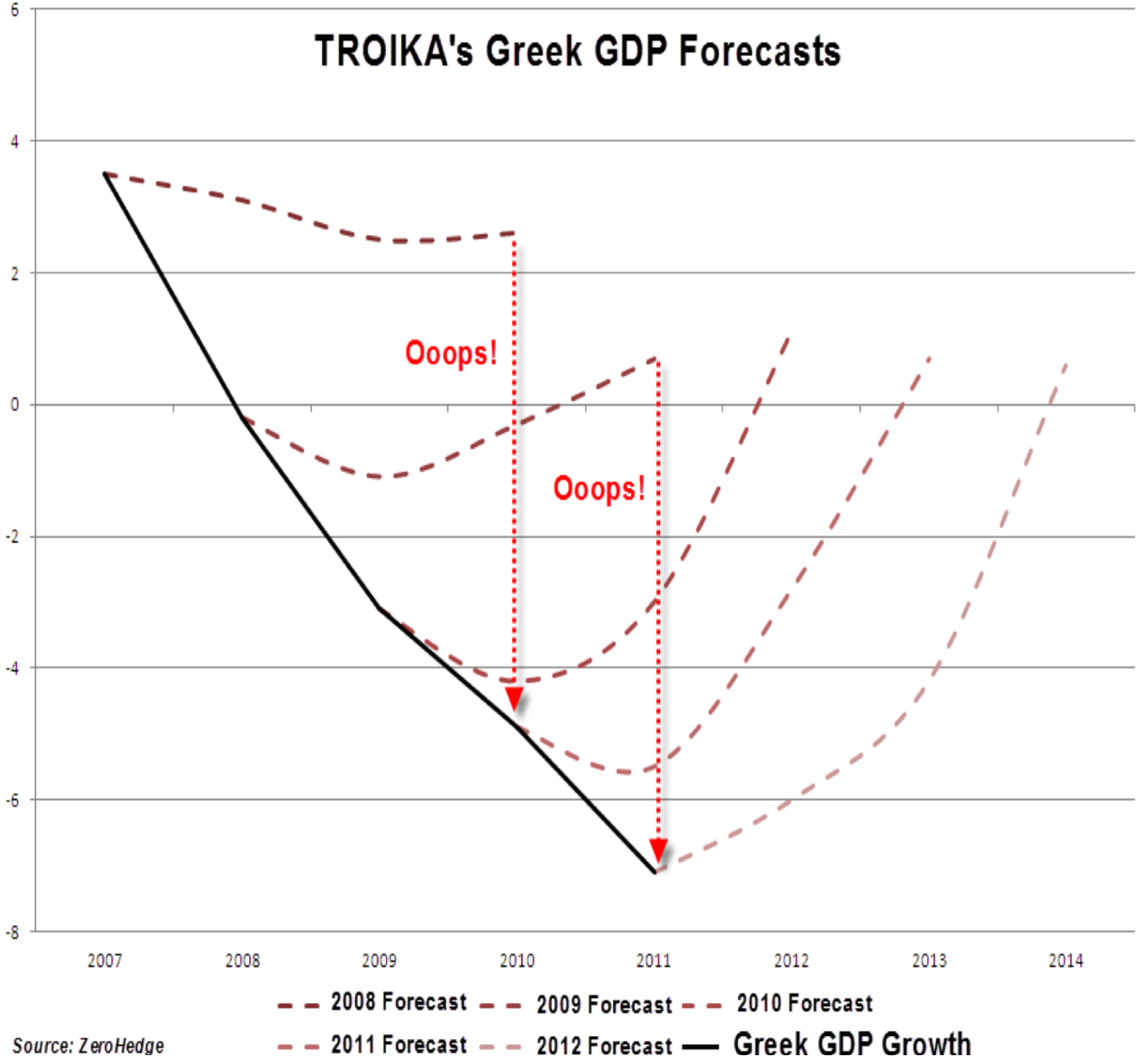
« A path of productive development, which is more creative and better directed, could correct the present disparity between excessive technological investment in consumption and insufficient investment in resolving urgent problems facing the human family. … Such creativity would be a worthy expression of our most noble human qualities, for we would be striving intelligently, boldly and responsibly to promote a sustainable and equitable development within the context of a broader concept of quality of life. On the other hand, to find ever new ways of despoiling nature, purely for the sake of new consumer items and quick profit, would be, in human terms, less worthy and creative, and more superficial » (192)

- IV Current paradoxes

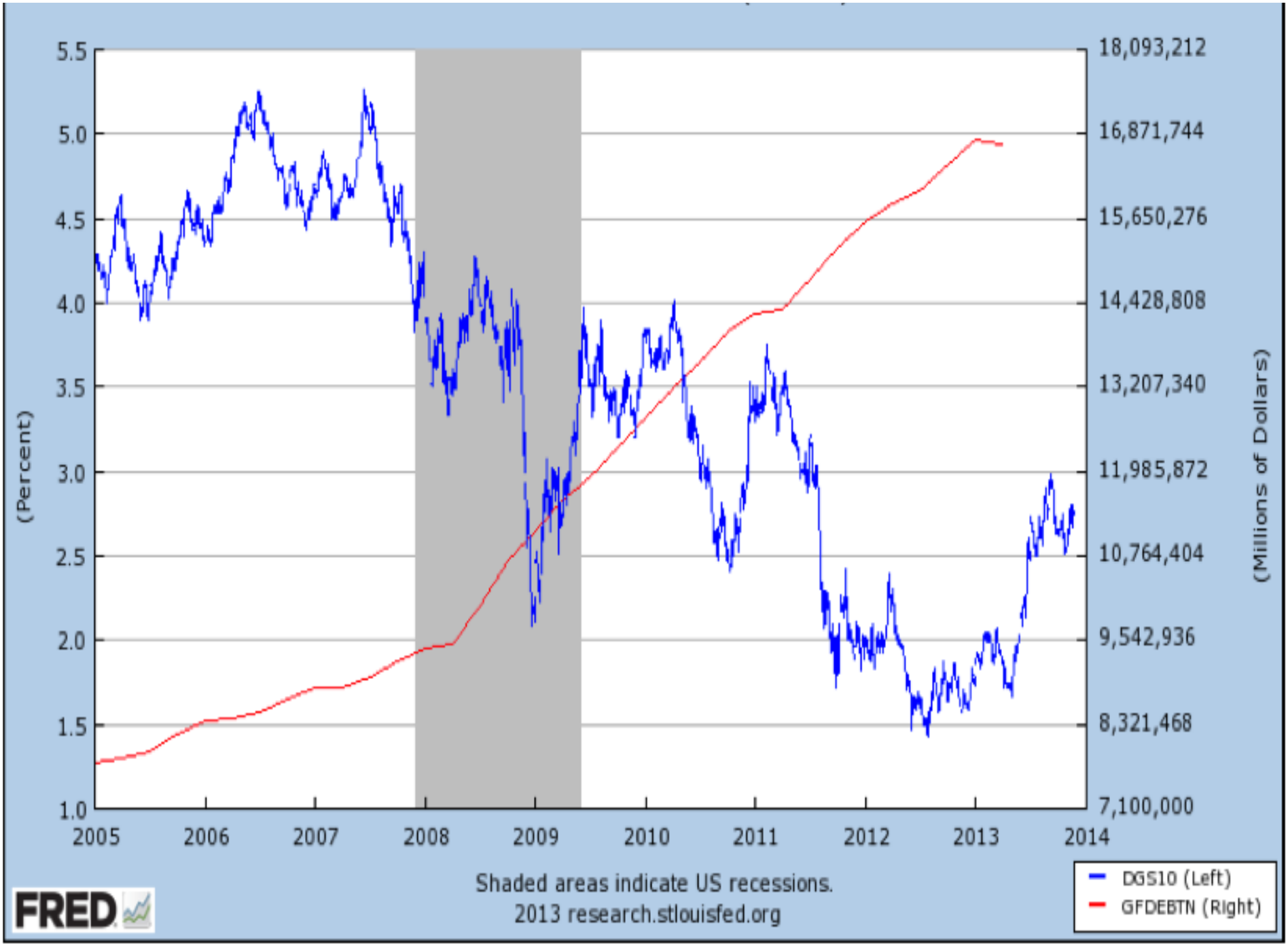
Growth = employment ?

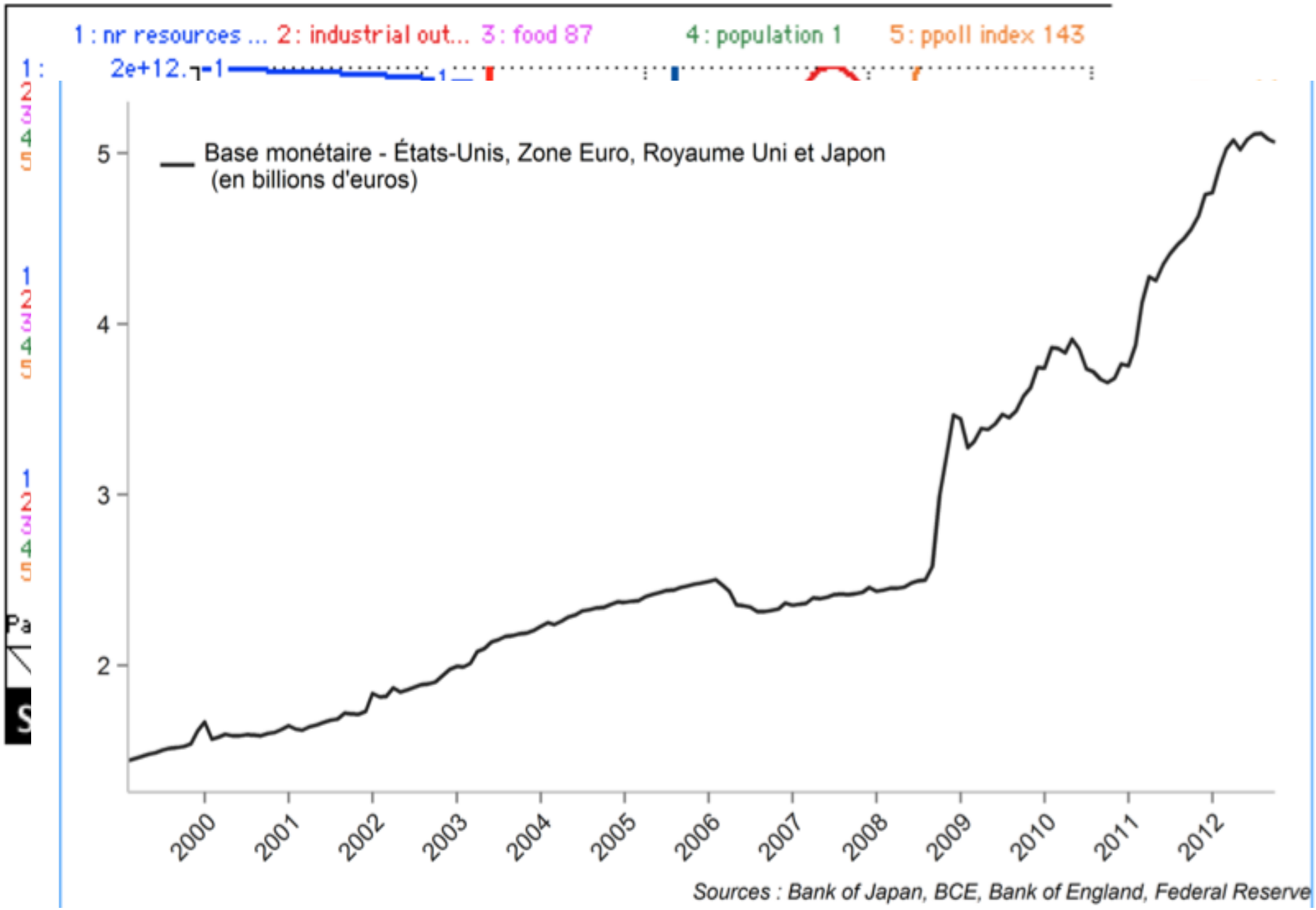



Source: IMF, World Economic Outlook database, April
Forecast per cent change in GDP between 2008 and 2012
Structural 2008-12 fiscal tightening (as per cent of potential GDP)
Slovak Republic
Austria
Belgium
Germany
France
Malta
Finland
Netherlands
Cyprus
Spain
Italy
Ireland
Slovenia
Portugal
Greece
y = -1.5048x - 0.4417
R2 = 0.5285
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-4.0
-2.0
0.0
2.0
4.0
6.0
8.0
10.0

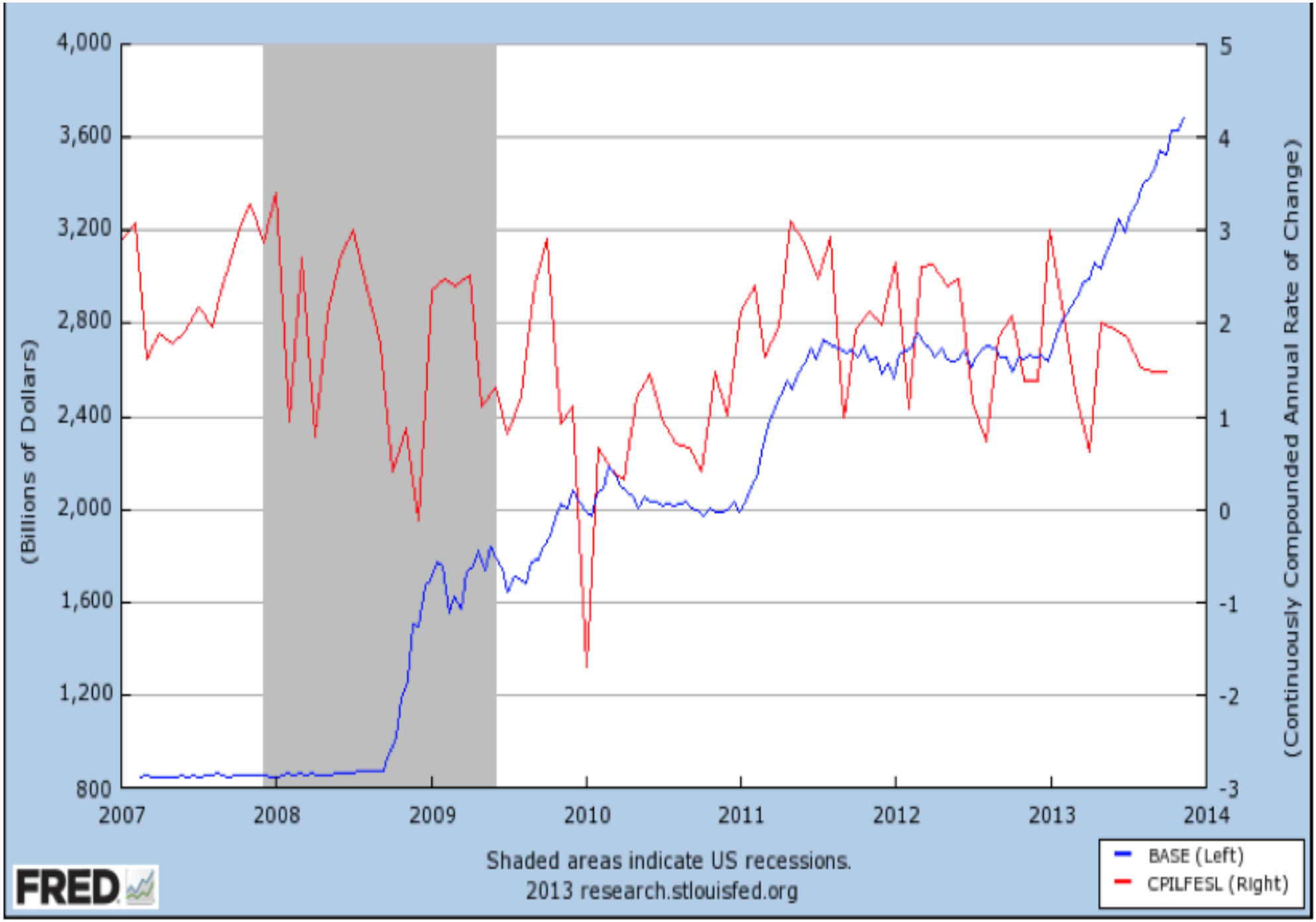


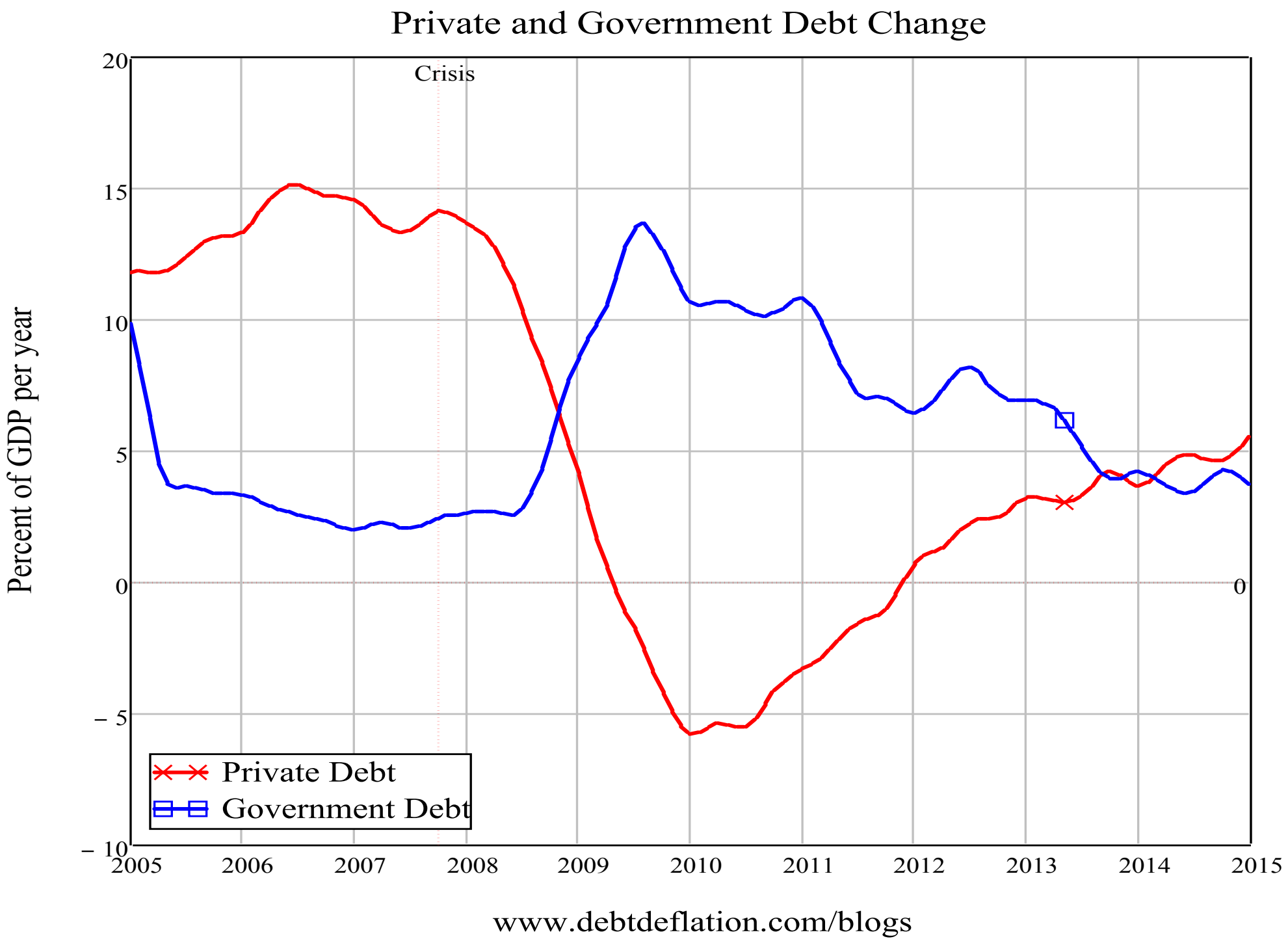
Source: ZeroHedge

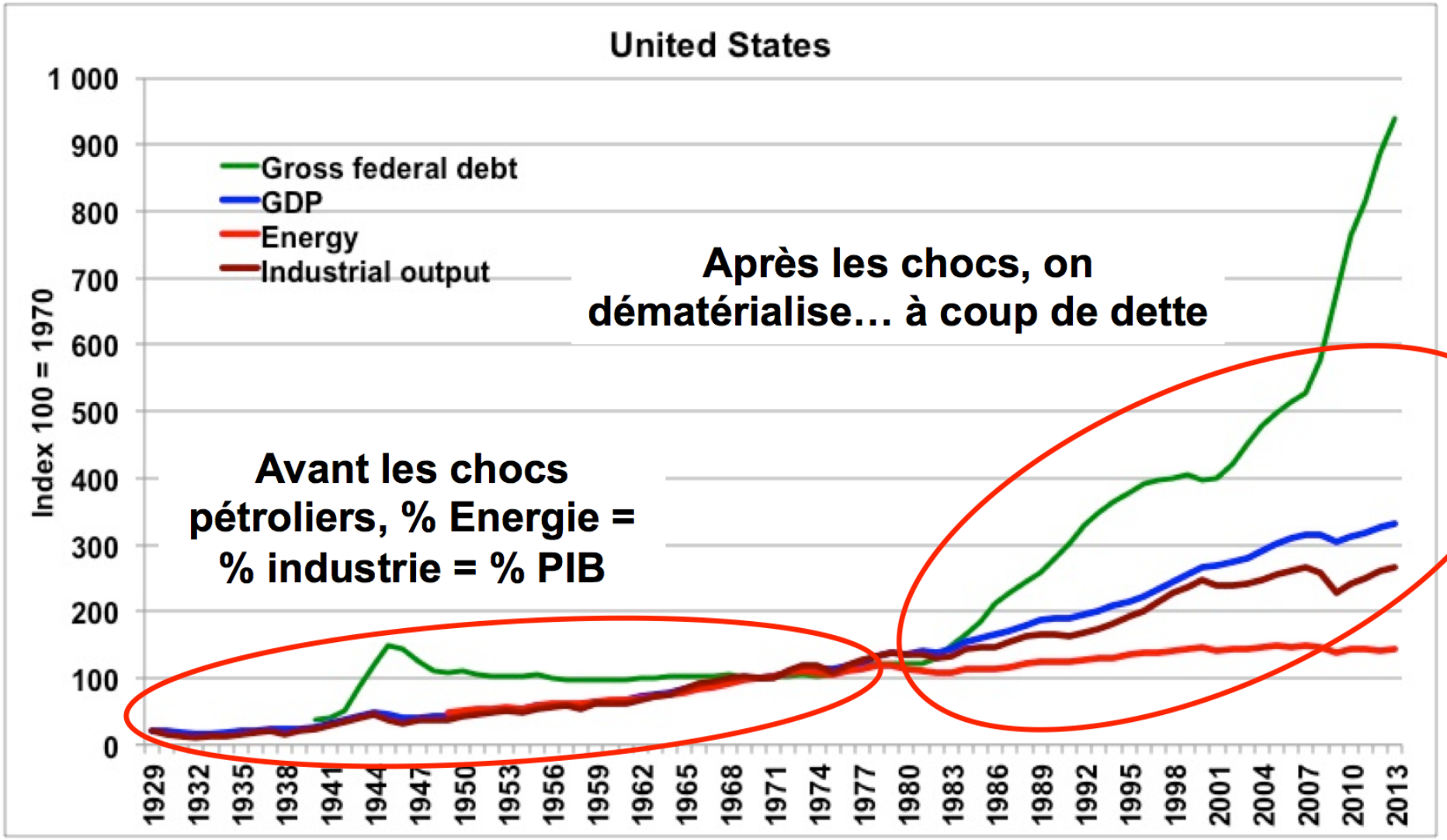

5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
(Percent)
18,093,212
16,871,744
15,650,276
14,428,808
13,207,340
11,985,872
10,764,404
9,542,936
8,321,468
7,100,000
(Millions of Dollars)
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Shaded areas indicate US recessions.
2013 research.stlouisfed.org
FRED
DGS10 (Left)
GFDEBTN (Right)


1 : nr resources ... 2 : industrial out... 3 : food 87 4 : population 1 5 : ppoll index 143
Base monétaire - États-Unis, Zone Euro, Royaume Uni et Japon
(en billions d'euros)
5
4
3
2
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Sources : Bank of Japan, BCE, Bank of England, Federal Reserve

Turner (2014)


4,000
3,600
3,200
2,800
2,400
2,000
1,600
1,200
800
(Billions of Dollars)
5
4
3
2
1
0
-1
-2
-3
(Continuously Compounded Annual Rate of Change)
2007
2008
2009
2010
2011
2012
2013
2014
Shaded areas indicate US recessions.
2013 research.stlouisfed.org
FRED
BASE (Left)
CPILFESL (Right)


Private and Government Debt Change
Crisis
20
15
10
5
0
– 5
– 10
Percent of GDP per year
0
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Private Debt
Government Debt
www.debtdeflation.com/blogs

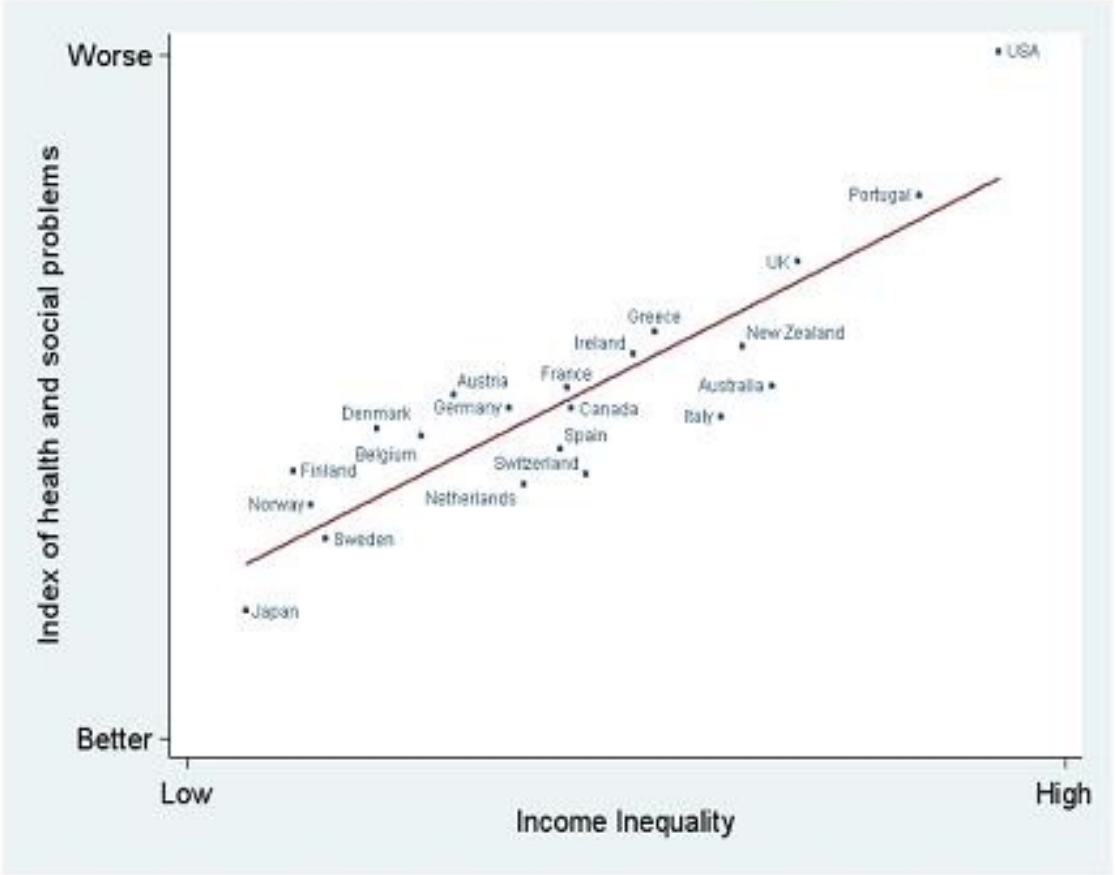


Evolution comparée, aux USA, de l'énergie, la production industrielle, le PIB, et la dette fédérale brute. Données EIA, FED, BEA

Prosperity and fairness

Index of:

- Life expectancy
- Math & Literacy
- Infant mortality
- Homicides
- Imprisonment
- Teenage births
- Trust
- Obesity
- Mental illness – incl. drug & alcohol addiction
- Social mobility



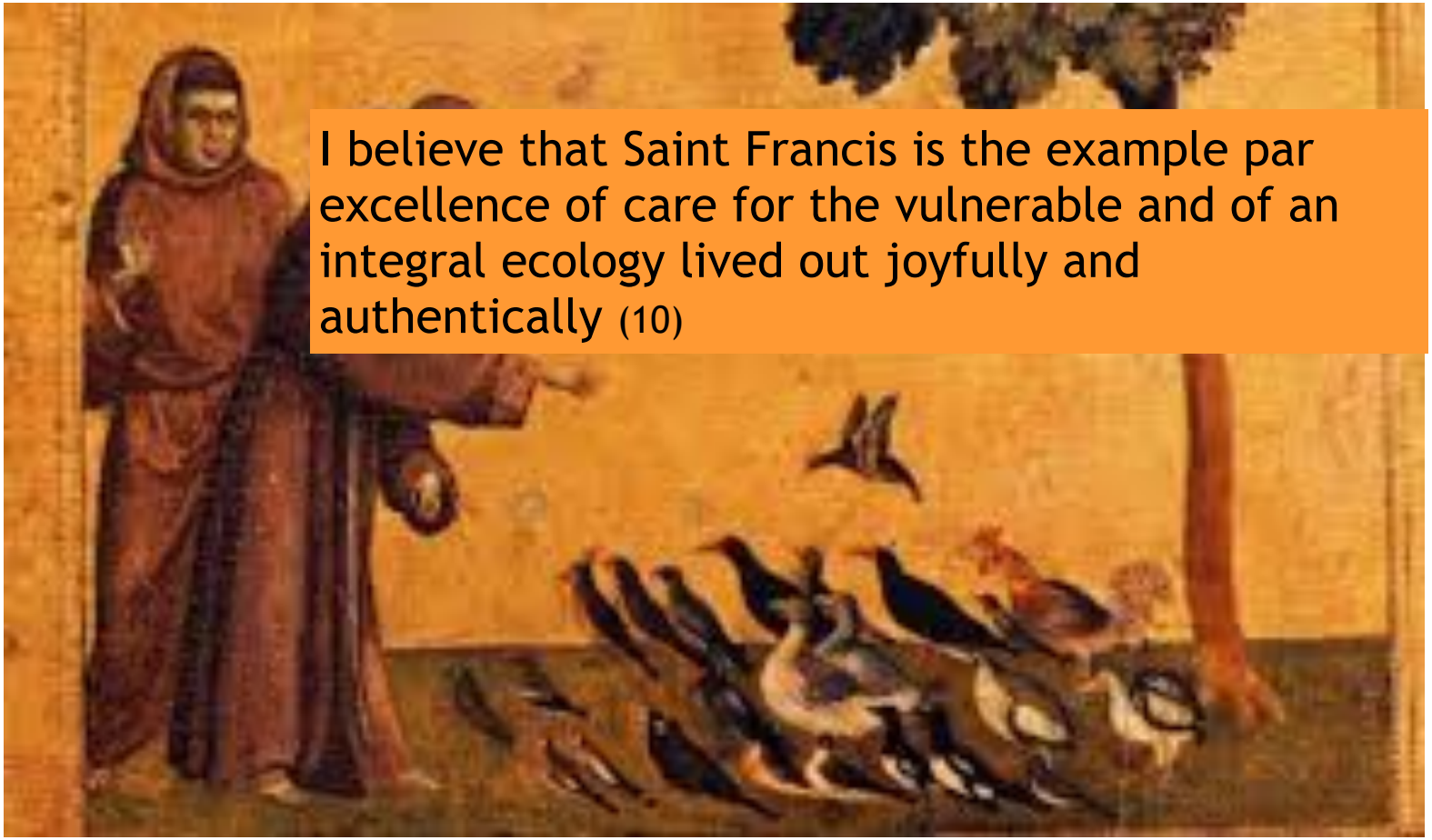
Source: Wilkinson & Pickett, The Spirit Level (2009)

www.equalitytrust.org.uk

V. Social justice.

What is Integral Ecology?

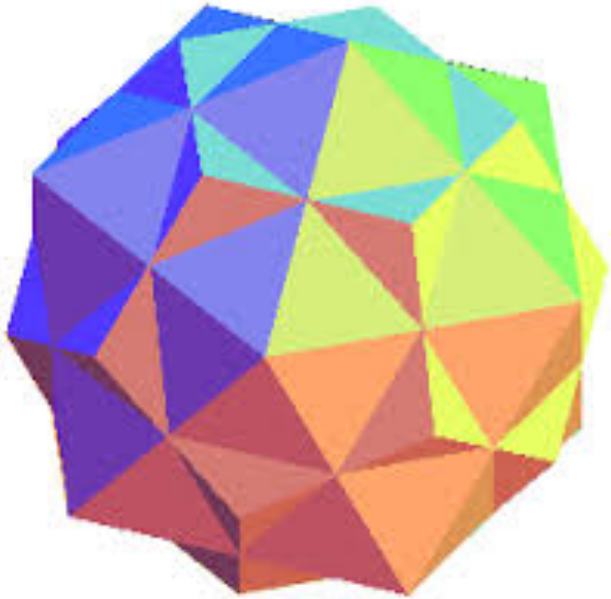
46. The social dimensions of global change include the effects of technological innovations on employment, social exclusion, an inequitable distribution and consumption of energy and other services, social breakdown, increased violence and a rise in new forms of social aggression, drug trafficking, growing drug use by young people, and the loss of identity. These are signs that the growth of the past two centuries has not always led to an integral development and an improvement in the quality of life. Some of these signs are also symptomatic of real social decline, the silent rupture of the bonds of integration and social cohesion.


I believe that Saint Francis is the example par excellence of care for the vulnerable and of an integral ecology lived out joyfully and authentically (10)

What societal project?

From the sphere…

to the polyhedron



Evangelii Gaudium, 236

Huge inequalities in the value chain

Rana Plaza disaster, Bangladesh, may 2013

The metrics: the **Relational Capability Index** (RCI)

Dimension	Component	Cutoff for deprivations	Weight
Integration into Networks	Employment status	No stable job with regular professional relations	1/12
	Transport	Roads to city center of bad quality	1/12
	Telecommunication	No phone	1/12
	Information	No regular access to news through radio, TV, newspapers or internet	1/12
Private relations	Household size	Lives alone	1/15
	Trust family	No trust in family	1/15
	Close friends	No close friends	1/15
	Financial support	No one outside family could lend them money in case of emergency	1/15
	Trust in community	No trust in the community	1/15
Civic commit-ment	Groups	No affiliation in groups (politics, religion, saving, sport)	1/15
	Collective action	No voluntary participation in political actions (meeting, strike, march or petition)	1/15
	Vote	No elector ID and does not think it is important to vote	1/15
	Solidarity	No altruistic activity and does not give to charity	1/15
	Trust in others	No trust in others	1/15

Wastepicker, Mexico, december 2014