Poverty and Inclusion in a Warming Planet

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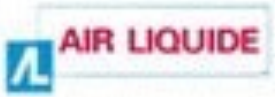
PASS, 29 Ott. 2016, Casina Pio IV


ÉCOLE
POLYTECHNIQUE

ENSAE
ParisTech

ADEME

AIR LIQUIDE

mirova
Responsible Investing

Schneider
Electric

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climat

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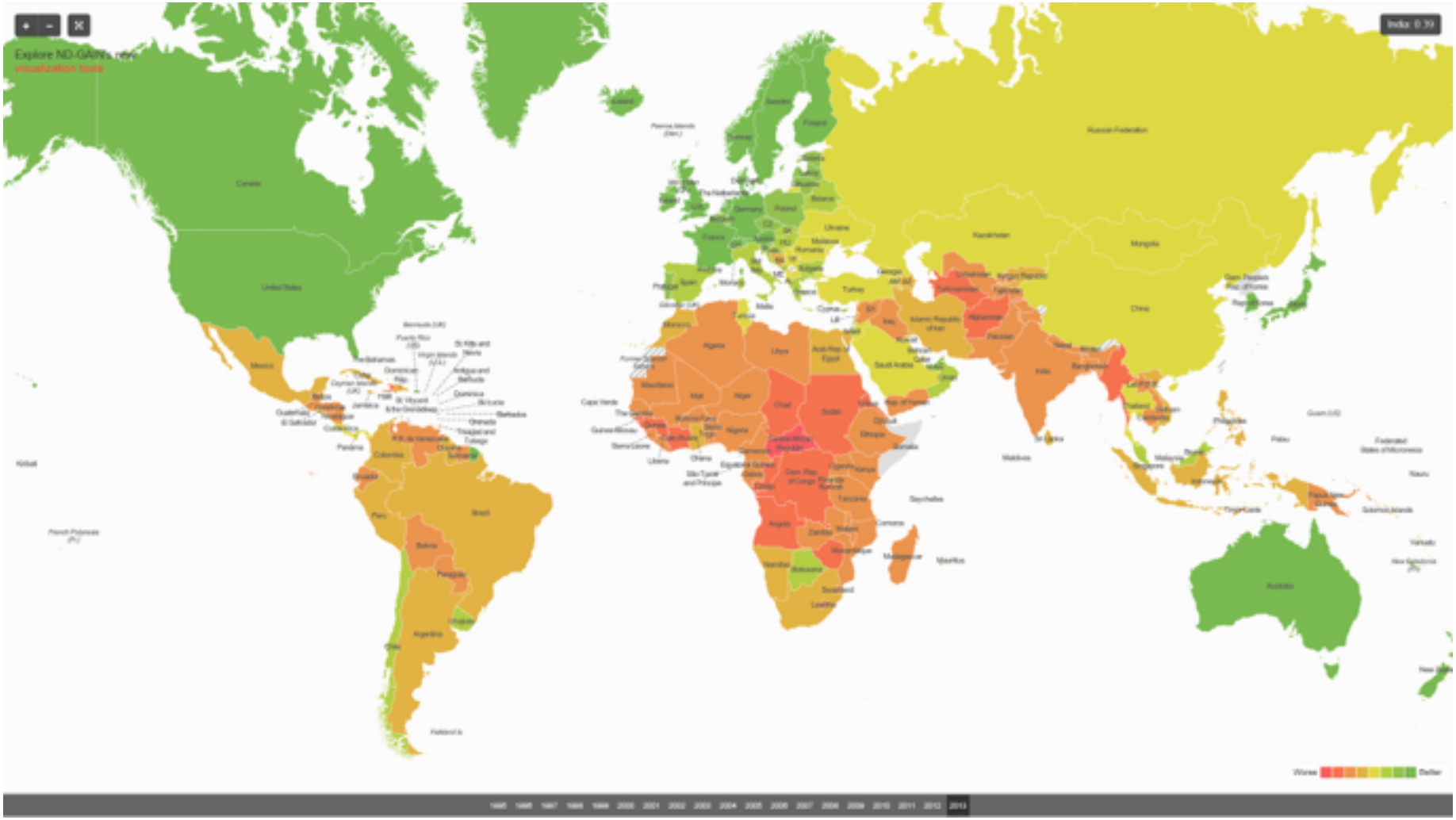
I. Climate and Poverty are intrinsically linked

Climate Change Vulnerability Index

Source : Maplecroft 2014

Adaptation capability



Source : GAIN Index / readiness map

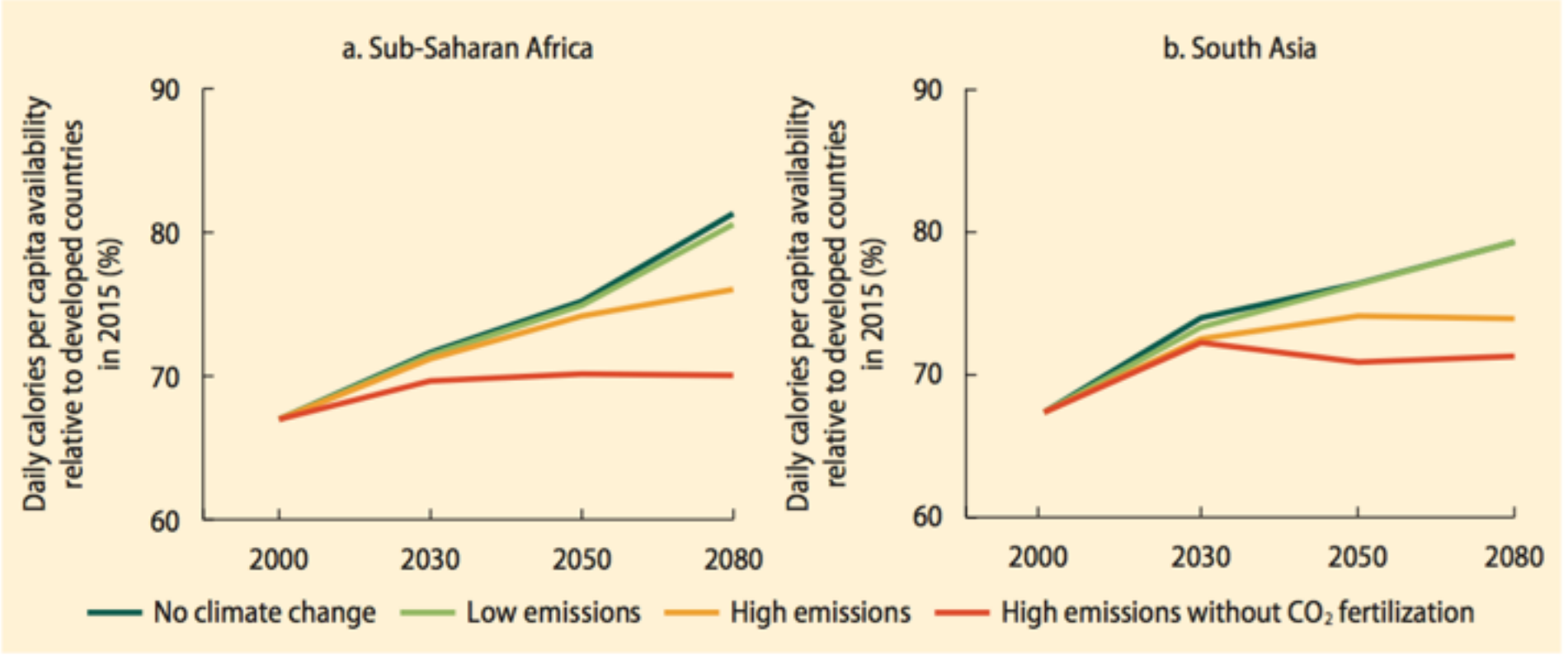
- *Shock Waves* (Steph. Hallegatte, et al., 2016)

- price shocks that can be linked to lower agricultural production (cf. Russian droughts in 2010);

- natural disasters that destroy poor people's assets and affect health and education;

- health shocks (e.g., death and illness) that are influenced by cli- mate and environmental conditions (like higher rainfall and more malaria outbreaks, or higher temperatures and more frequent diarrhea).

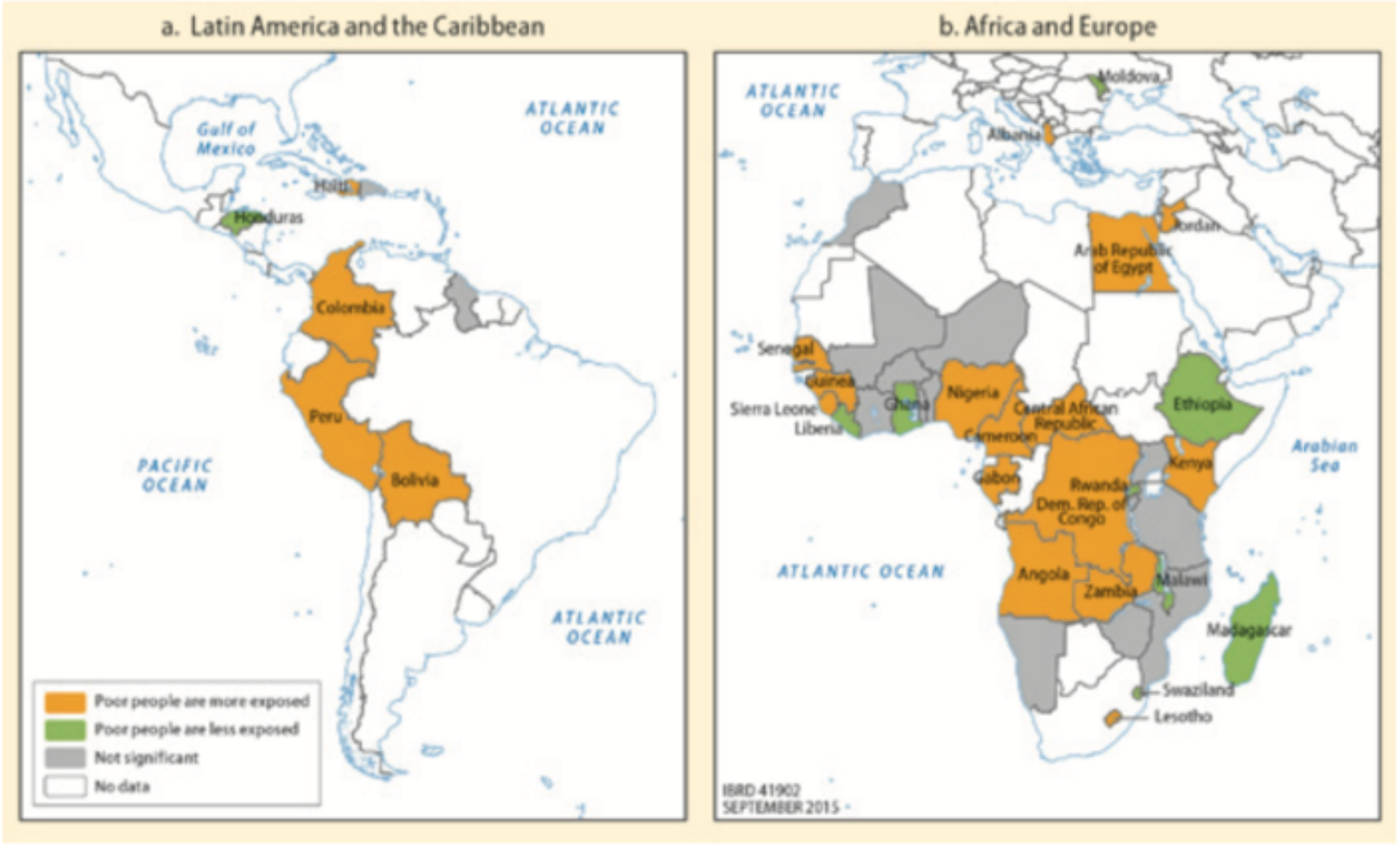
- people may reduce investments and asset accumulation because of the possibility of losses and select lower-risk but lower-return activities—a rational strategy to avoid catastrophic outcomes, but one that can keep them in poverty.



Source: Havlík et al., forthcoming.
Note: Results are based on simulations from the Global Biosphere Management Model (GLOBIOM) in a scenario with large population growth and little economic growth.

MAP O.1 The urban poor are more exposed to river floods in many countries

(Poverty exposure bias for floods in urban areas)

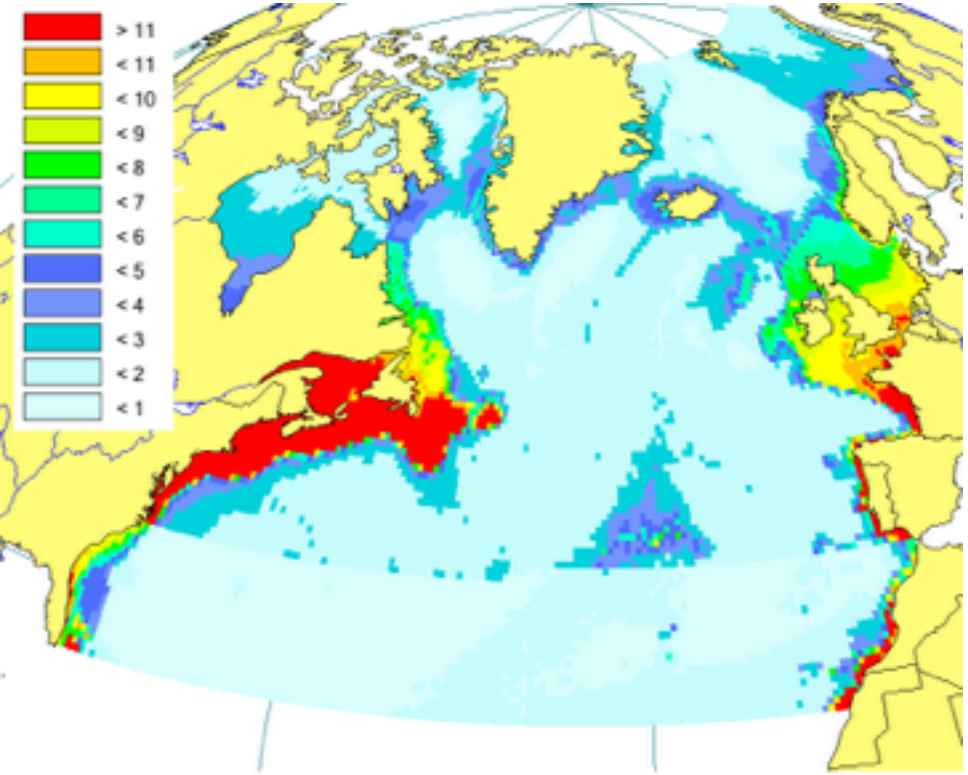


Source: World Bank (IBRD 41902, September 2015) based on Winsemius et al., forthcoming.
Note: Exposure was calculated for river floods.

TABLE O.1 Climate change threatens to worsen poverty, but good development can help

Policy choices	Climate change scenario				
	No climate change	Low-impact scenario		High-impact scenario	
	Number of people in extreme poverty by 2030	Additional number of people in extreme poverty due to climate change by 2030			
Prosperity scenario	142 million	+3 million		+16 million	
		Minimum +3 million	Maximum +6 million	Minimum +16 million	Maximum +25 million
Poverty scenario	900 million	+35 million		+122 million	
		Minimum −25 million	Maximum +97 million	Minimum +33 million	Maximum +165 million

Source: Rozenberg and Hallegatte, forthcoming.
Note: The main results use the two representative scenarios for prosperity and poverty. The ranges are based on 60 alternative poverty scenarios and 60 alternative prosperity scenarios.



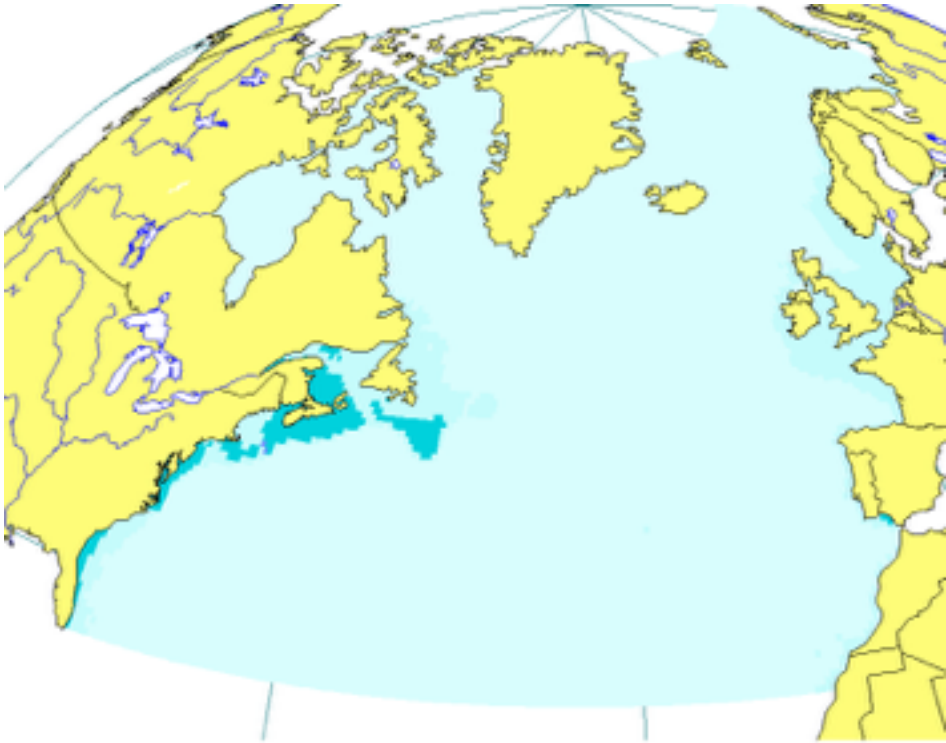
Abondance des poissons
Atlantique nord en 2000

Christensen et al. (Fish & Fisheries, 2003)

Abondance des poissons
Atlantique nord en 1900

Une mer sans poissons en 2050?

(Philippe Cury, Calmann-Lévy, 2008)



II. Relational Capability

RCI = Relational Capability Index

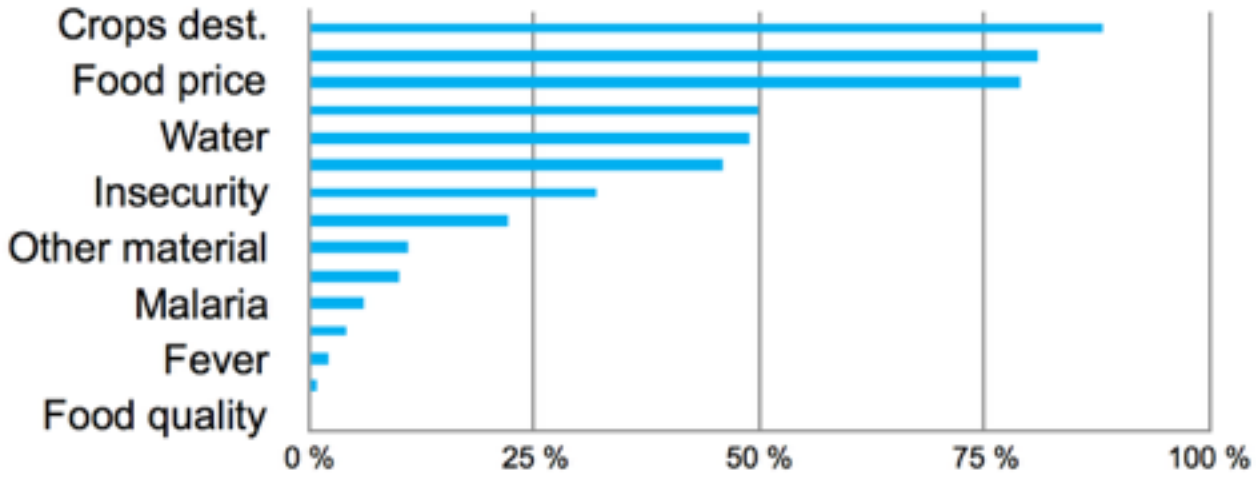
Renouard, Giraud, Lhuillier et al.

- Impacts on poverty are usually **multidimensional** and should be assessed as such
- **Social networks** are a central element of human development and dignity.
- Projects that do not primarily aim at having an impact on RCI can still affect social networks.

Dimension	Component	Weight
Integration to Networks	Employment status	1/9
	Transport	
	Telecommunication	1/9
	Information	1/9
Private relations	Household size	
	Family ties	
	Close friends	
	Financial support	1/6
	Trust in community	1/6
Civic commitment	Groups	
	Collective action	
	Vote	
	Solidarity	1/6
	Trust in others	1/6

September 2012 flood = Largest disaster in Nigeria since 1990 (source: EM-DAT)

Hazards declared in the affected communities



Help provided by Total oil company:

- First aid: canoes, relief materials, water, sent directly to communities
- Follow-up: material help provided through communities representatives

Results:

- Flood → more internal trust but less altruism
- External help → more altruism
- Unequal repartition of help reduced RCI.

Interpretation: the way external help influences the social network matters.

III. Nobody can finance the energy shift?

The four pillars of decarbonization

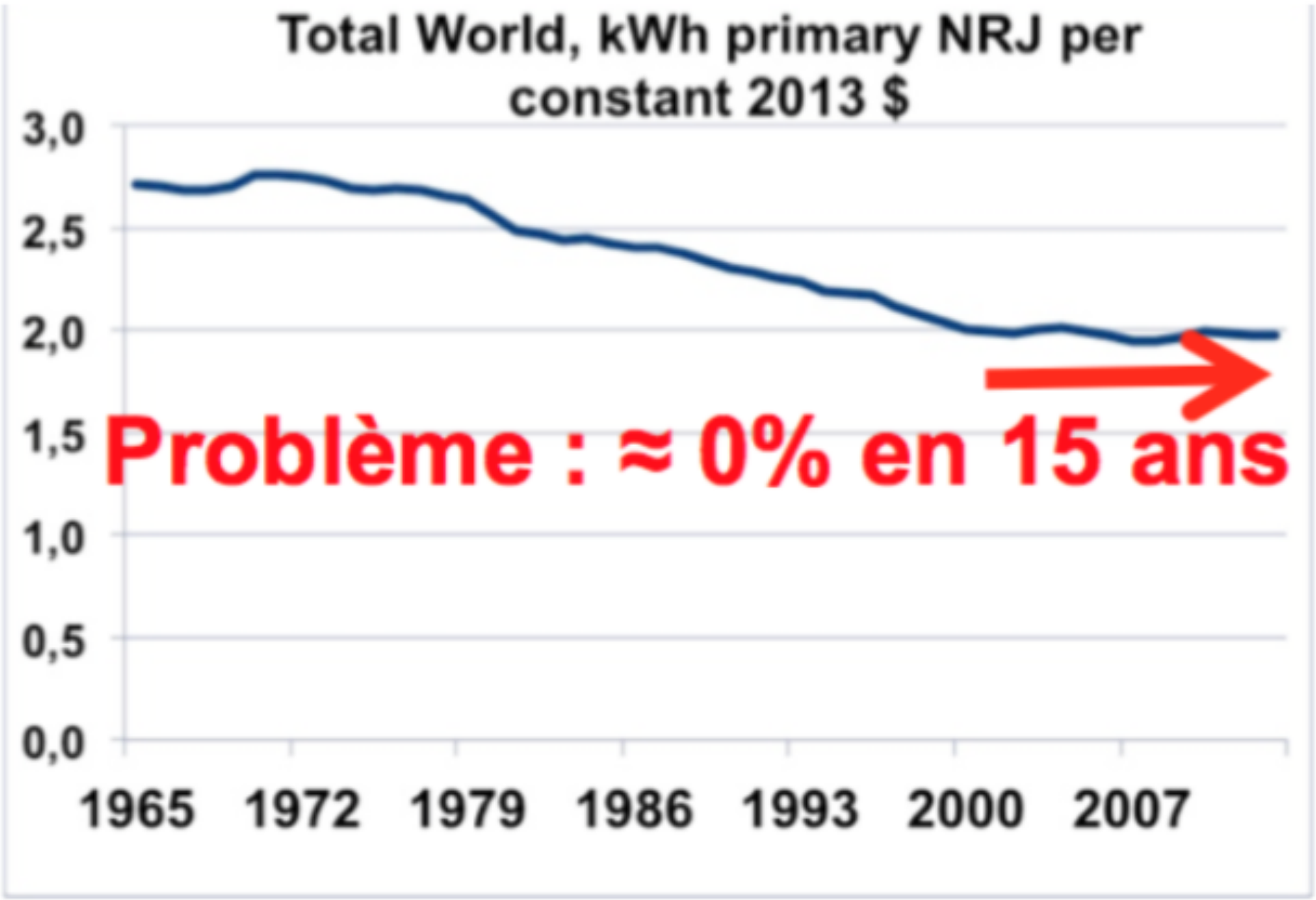
FIGURE 1.3 The Four Pillars of Decarbonization

Source: All photos © Shutterstock. Used with the permission of the photographers and Shutterstock. Further permission required for reuse.

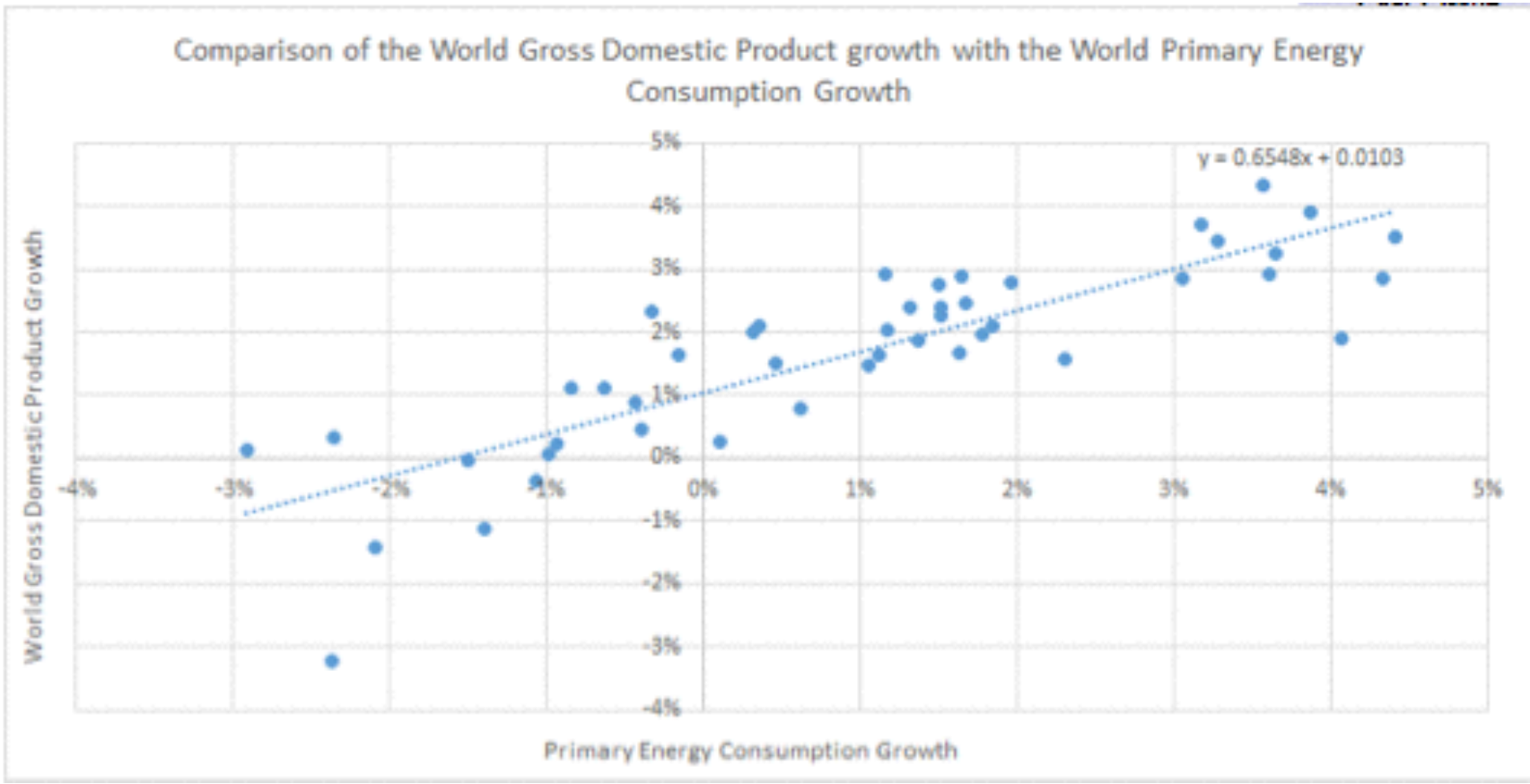
From The World Bank, Decarbonizing Development Report, p 32

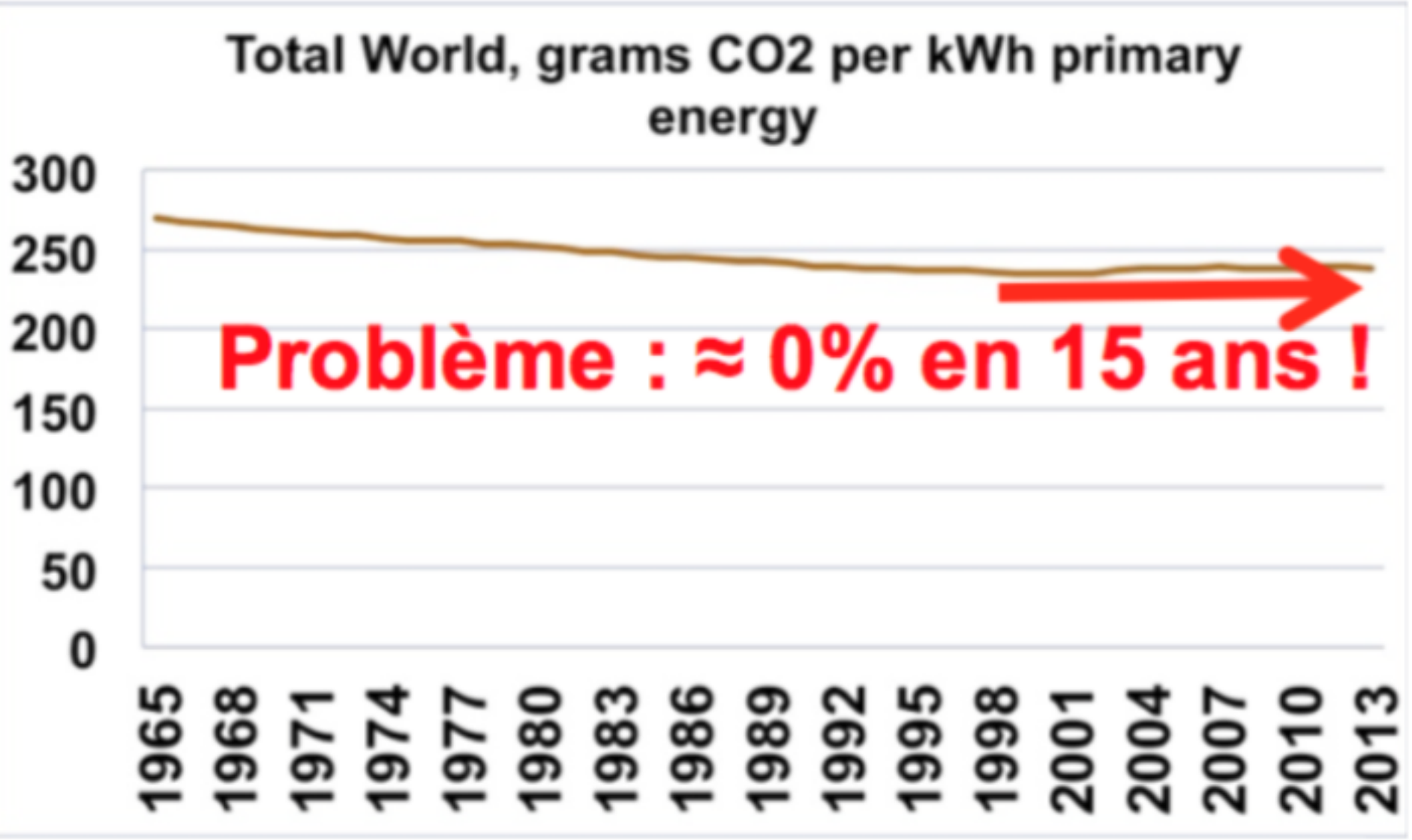
Kaya's equation

$$\mathrm{CO_2} = \frac{\mathrm{CO_2}}{E} \times \frac{E}{\mathrm{PIB}} \times \frac{\mathrm{PIB}}{\mathrm{Pop}} \times \mathrm{Pop}.$$


Total World, kWh primary NRJ per constant 2013 $
3,0
2,5
2,0
1,5
1,0
0,5
0,0
1965
1972
1979
1986
1993
2000
2007
Problème : ≈ 0% en 15 ans !

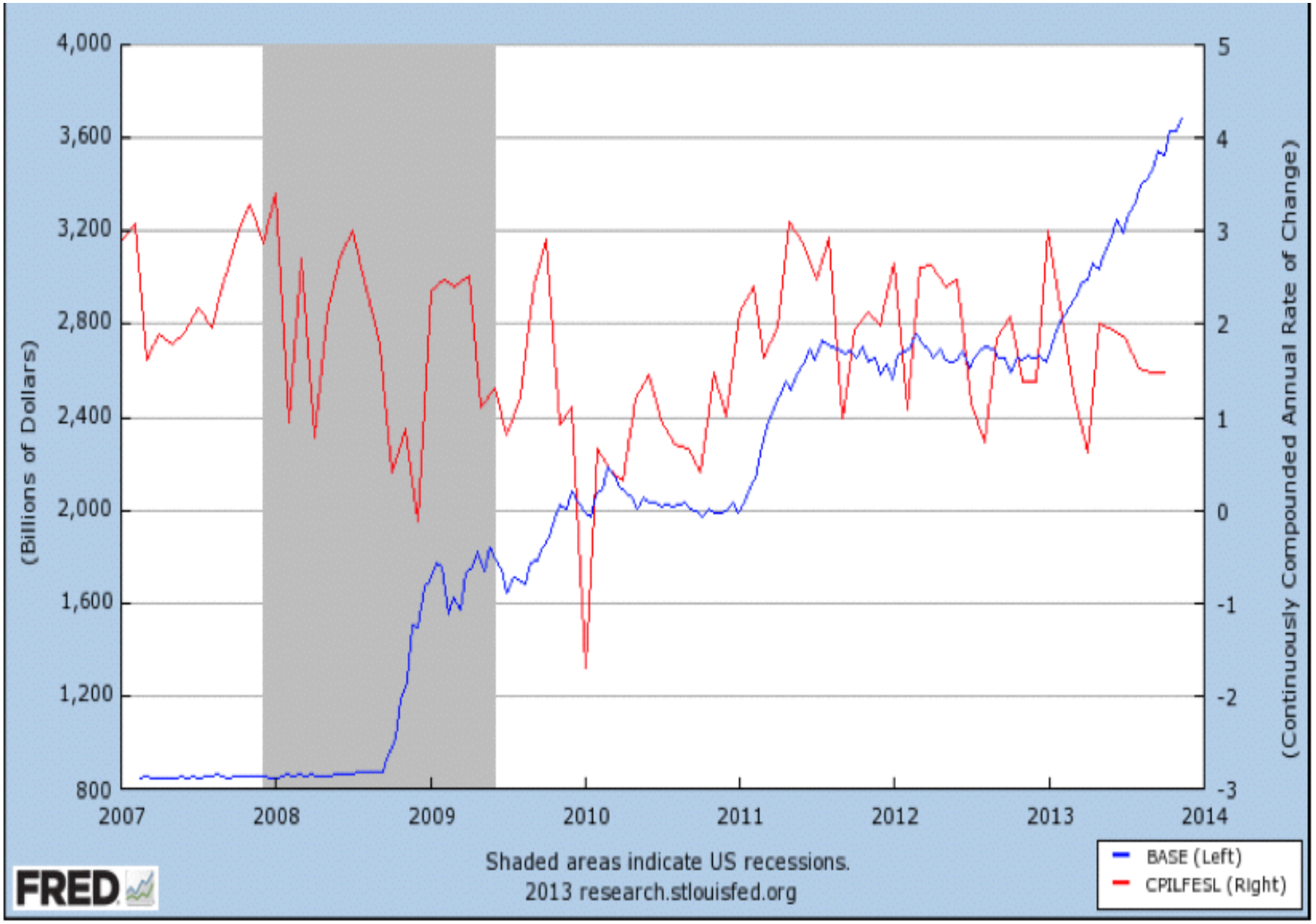
GDP elasticity wrt Primary Energy? Around 60%...

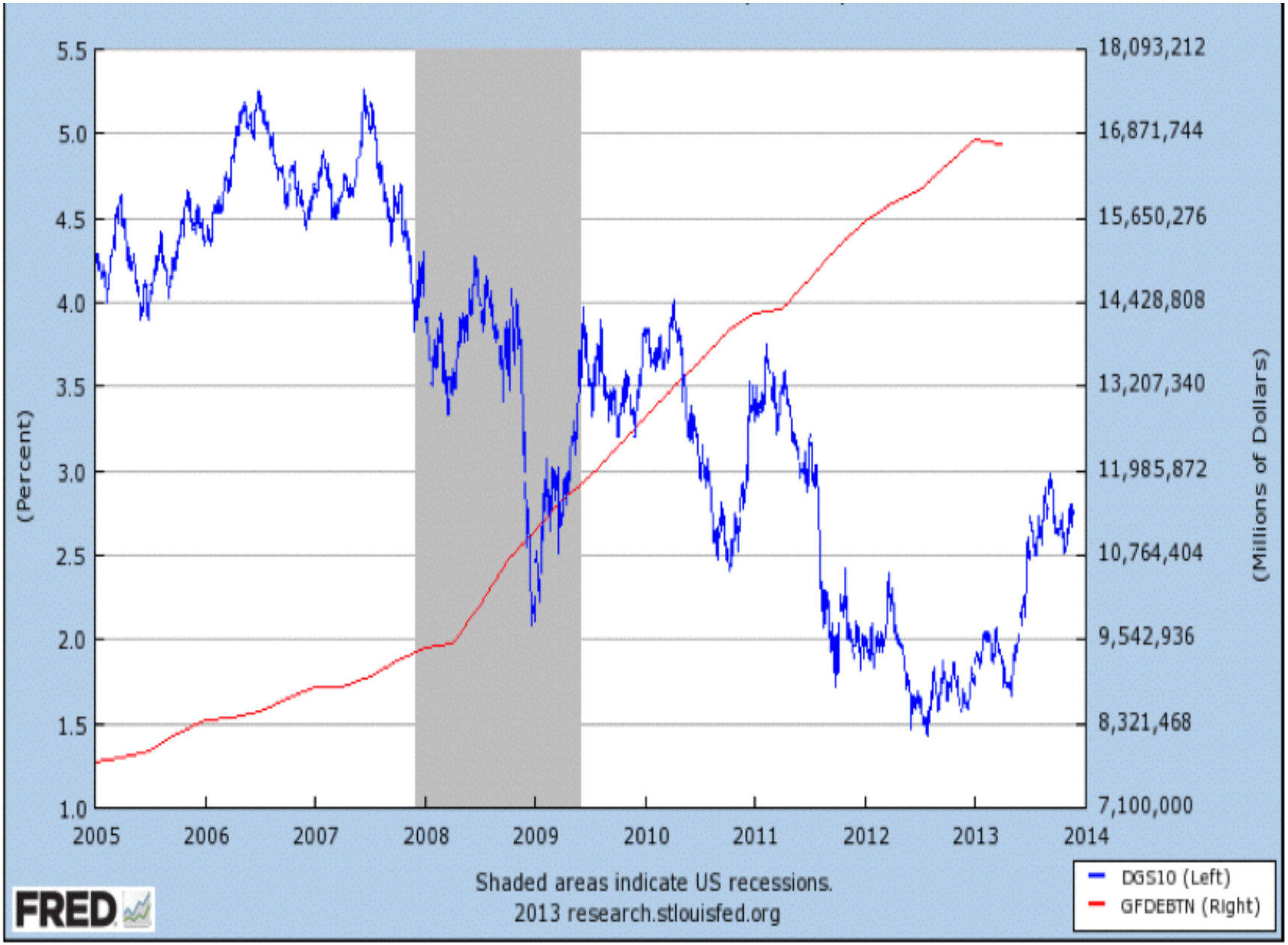



Total World, grams CO2 per kWh primary energy
300
250
200
150
100
50
0
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007
2010
2013
Problème : ≈ 0% en 15 ans !

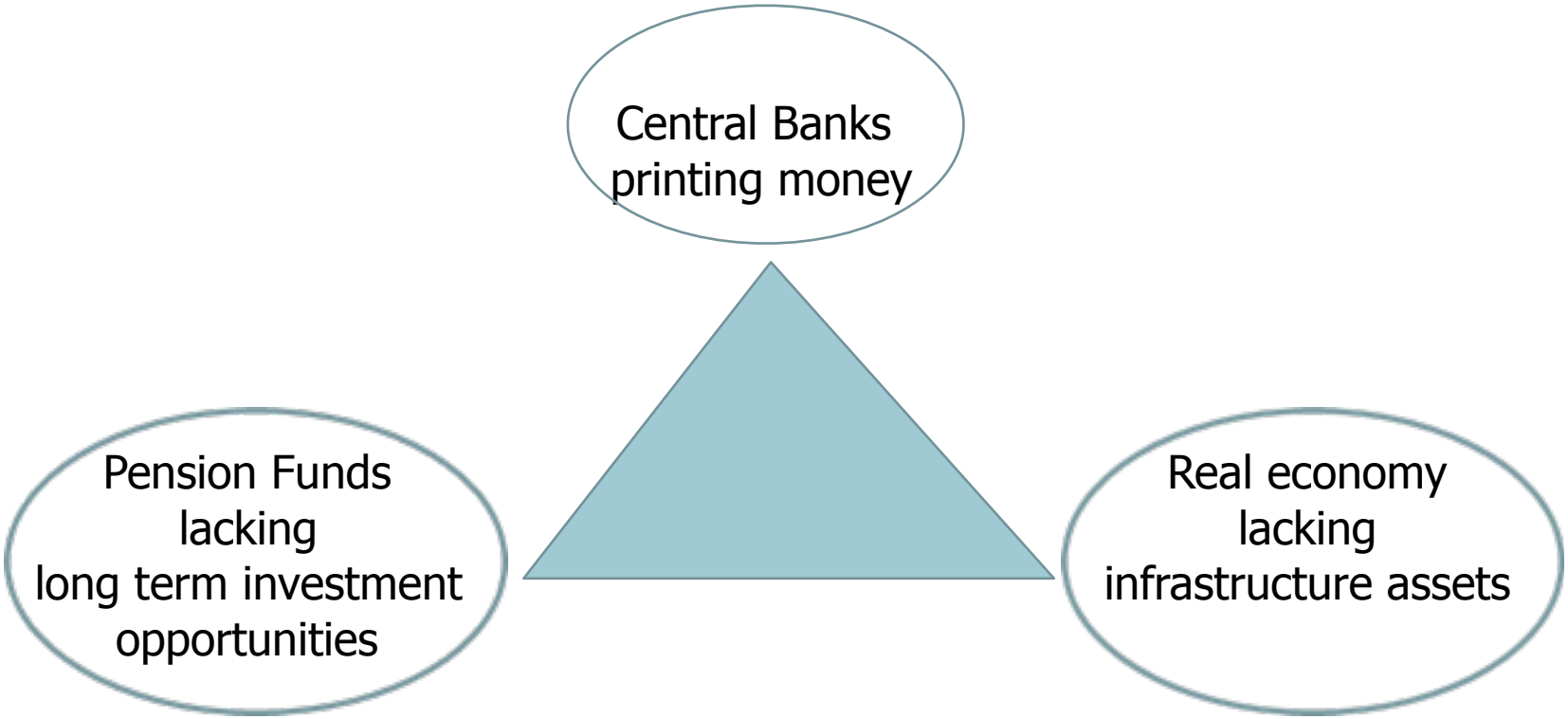
- New Climate Economy Report:

- US $ 90 trillions are needed in the next 15 years to finance green infrastructures.
- approx. 2 trillions/year in Northern countries
- approx. 4 trillions/year in Southern countries.


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)

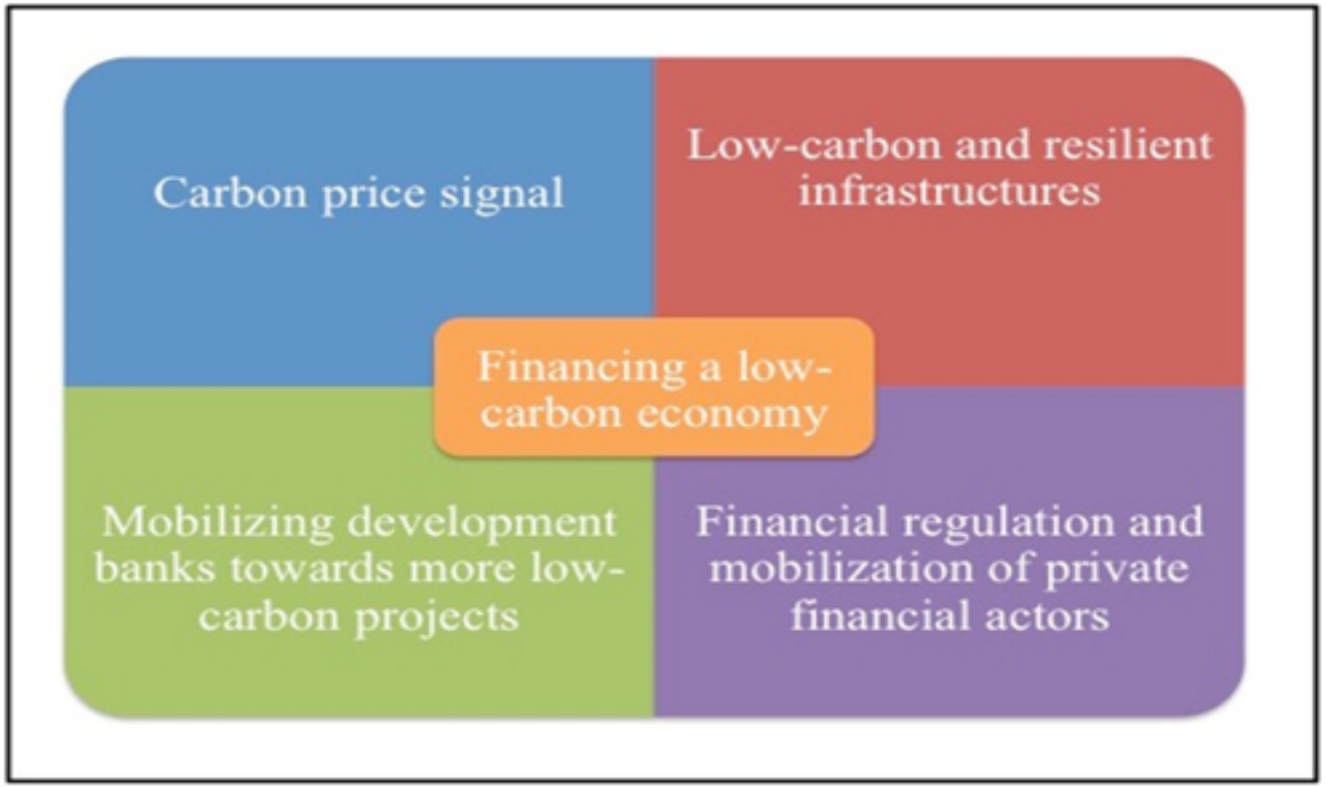

5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
(Percent)
18,093,212
16,871,744
15,650,276
14,428,808
13,207,340
11,985,872
10,764,404
9,542,936
8,321,468
7,100,000
(Millions of Dollars)
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Shaded areas indicate US recessions.
2013 research.stlouisfed.org
FRED
DGS10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

Money is already there



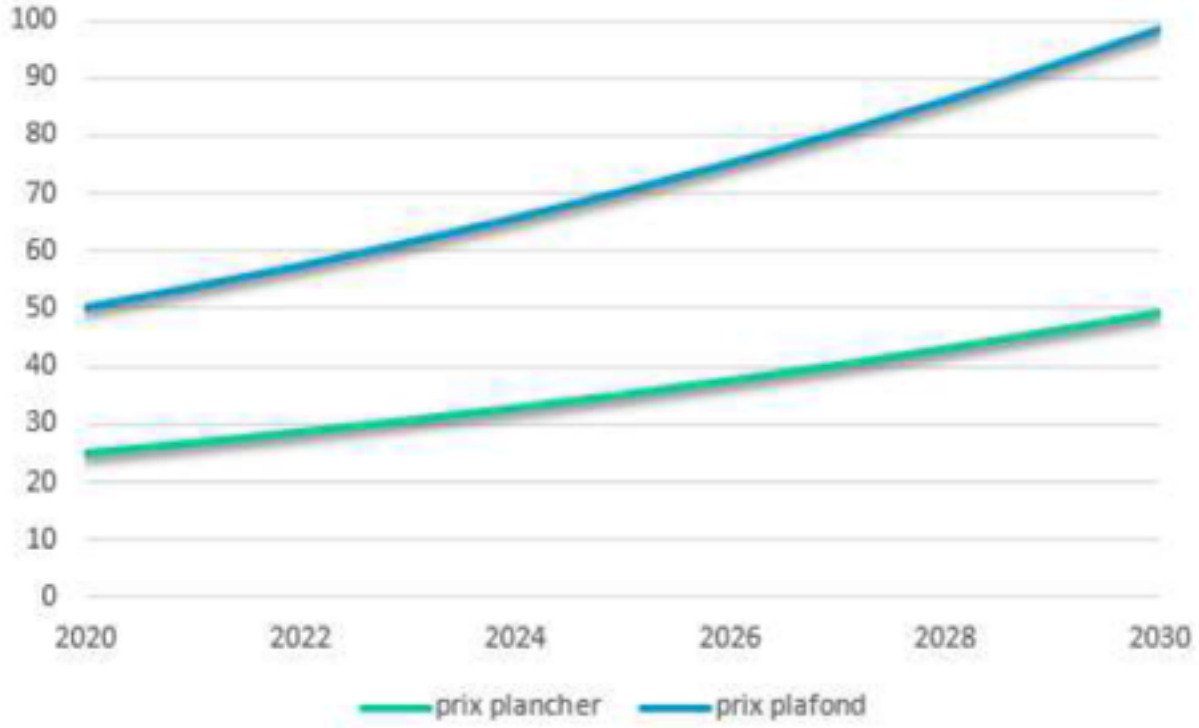
A unique macro-economic opportunity

Policy: making a low carbon economy work



A carbon floor-price to boost the EU carbon market

Proposition 3 : Fixer le prix plancher selon la trajectoire suivante : entre 20€ et 30€ en 2020, avec une augmentation annuelle de 5 à 10% afin de dépasser 50€ en 2030, et d'accélérer la transition vers les solutions les moins carbonées, notamment dans le secteur de l'énergie. Fixer le prix plafond à 50€ en 2020 avec une croissance annuelle



IV. Changing our view on the BAU scenario

Blanchard (NBER 2016)

1. *My own view is that, after the highly surprising nature of the data flow over the past ten years, this basic premise of "serious modeling" is wrong: we simply do not have a settled successful theory of the macroeconomy. The choices made 25-40 years ago —made then for a number of excellent reasons— should not be treated as written in stone or even in pen. By doing so we are chocking off paths for understanding the macroeconomy".*
2. *Many readers are probably thinking to themselves: there are ways to fix our modeling paradigm to explain the last ten years of data. [...] But this "let's rescue the past paradigm if at all possible" strikes me as highly unlikely to lead to true progress".*

The Trouble with Macroeconomics

Journal Title
XX(X):1–20
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DOI: 10.1177/ToBeAssigned
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SAGE

Paul Romer[1]

Abstract

In the last three decades, the methods and conclusions of macroeconomics have deteriorated to the point that much of the work in this area no longer qualifies as scientific research. The treatment of identification in macroeconomic models is no more credible than in the first generation large Keynesian models, and is worse because it is far more opaque. On simple questions of fact, such as whether the Fed can influence the real fed funds rate, the answers verge on the absurd. The evolution of macroeconomics mirrors developments in string theory from physics, which suggests that they are examples of a general failure mode of for fields of science that rely on mathematical theory in which facts can end up being subordinated to the theoretical preferences of revered leaders. The larger concern is that macroeconomic pseudoscience is undermining the norms of science throughout economics. If so, all of the policy domains that economics touches could lose the accumulation of useful knowledge that characteristic of true science, the greatest human invention.

Macroeconomic Model for Climate Change

Climate module overview

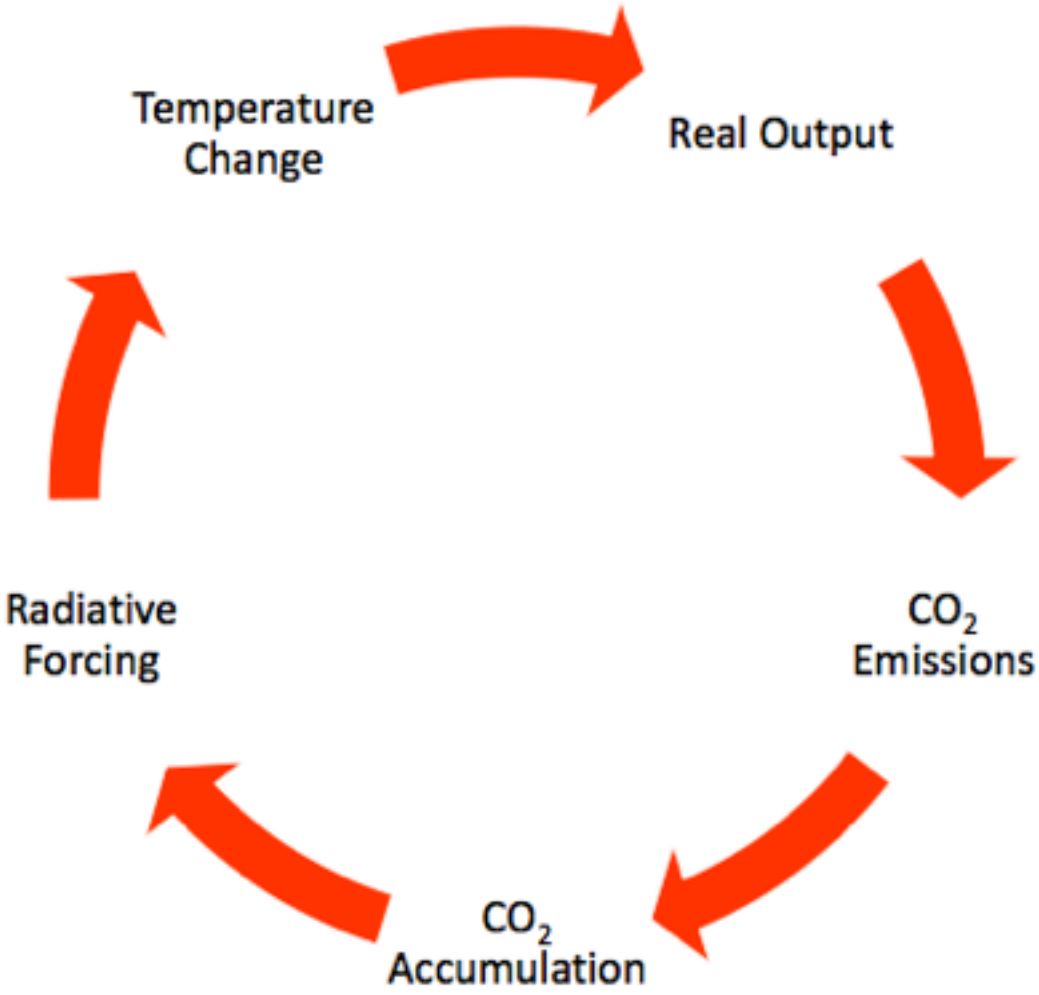
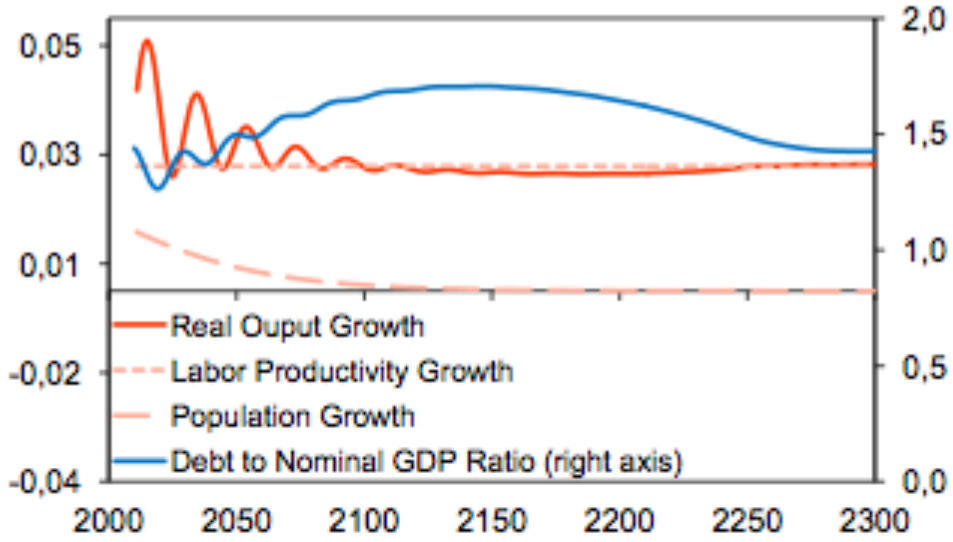
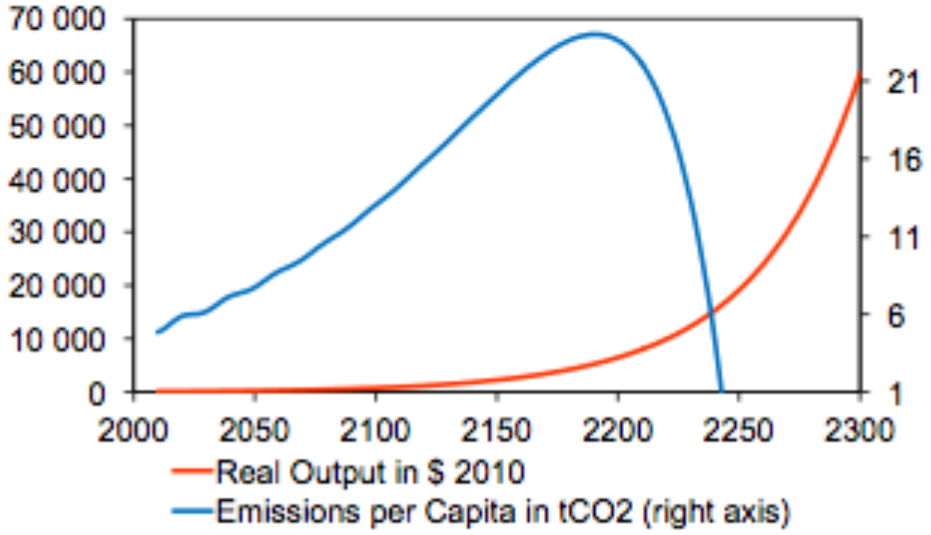


Figure: Diagram of the Economy-Climate interactions.

Numerical Simulations

The Business-As-Usual Scenario





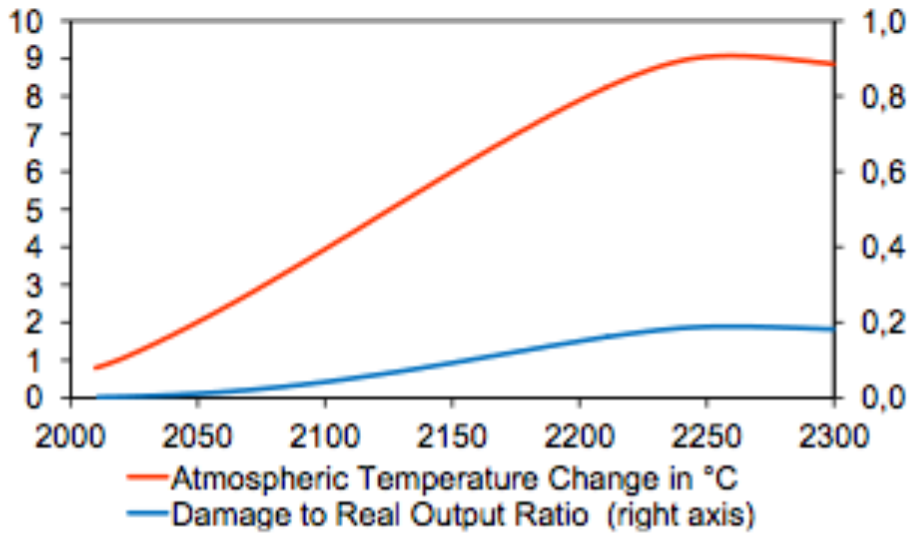


Figure: Trajectories of the main simulation outputs in the Business-as-usual case.

Numerical Simulations

The Dietz-Stern Scenario

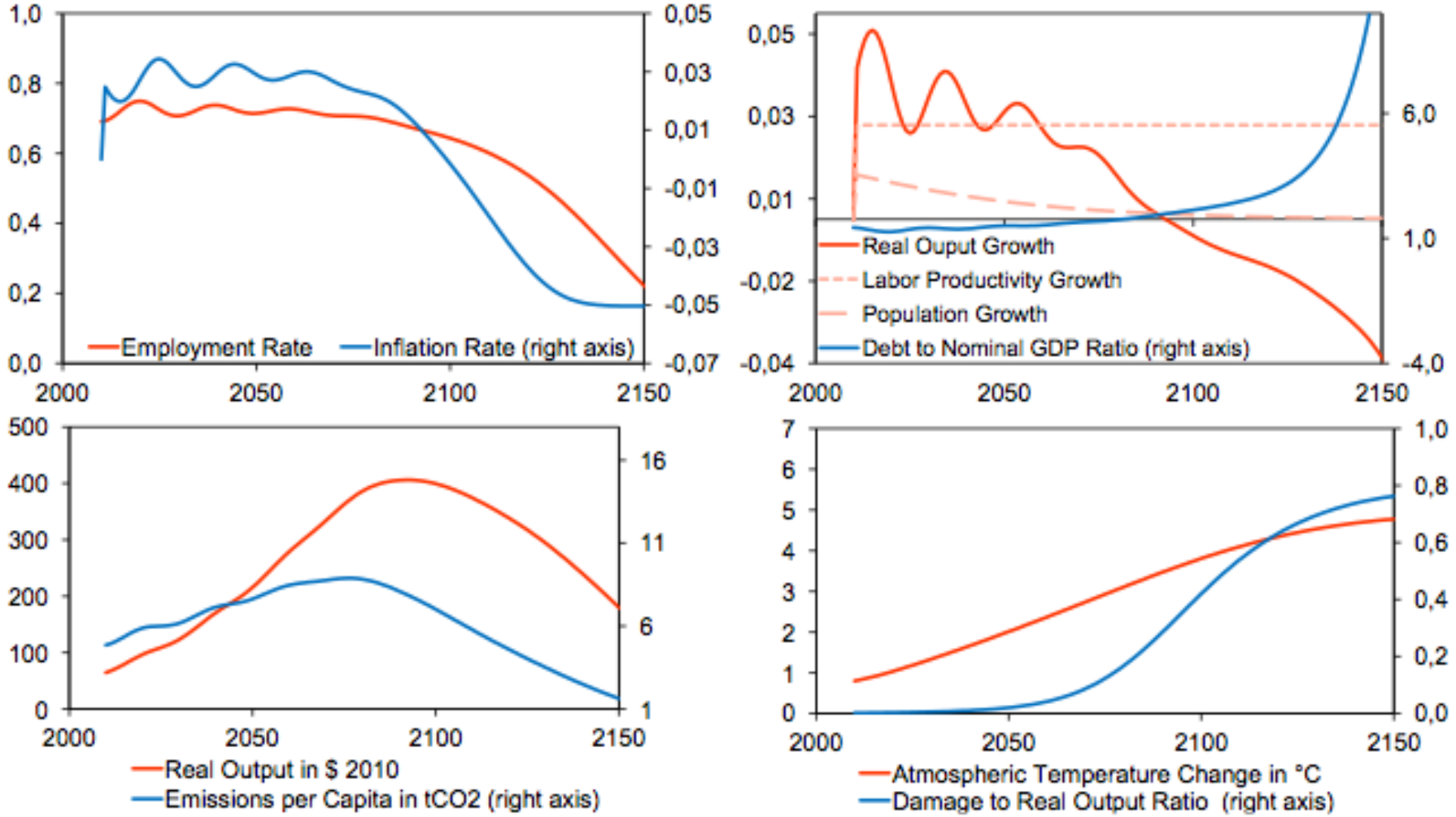
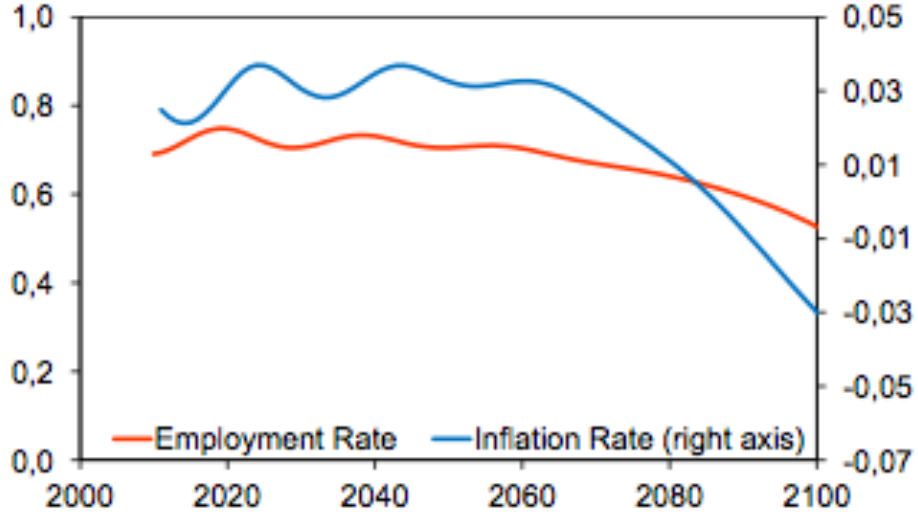
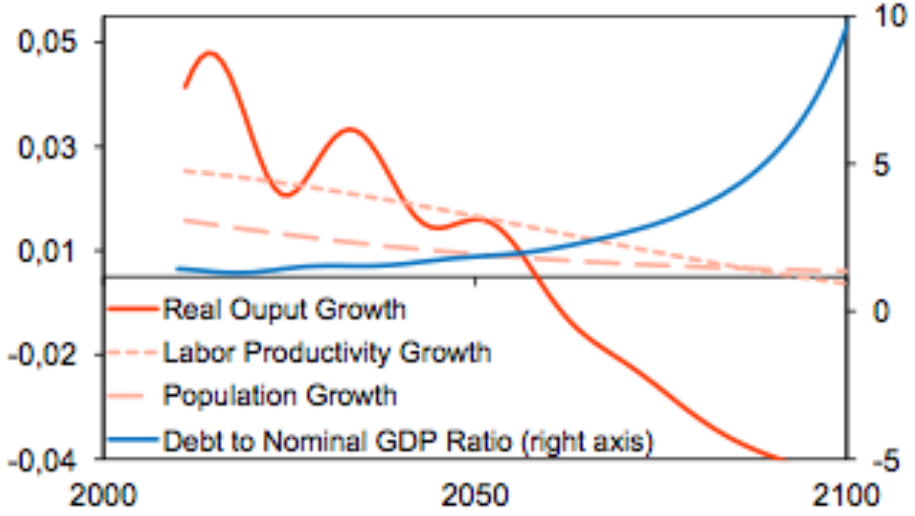


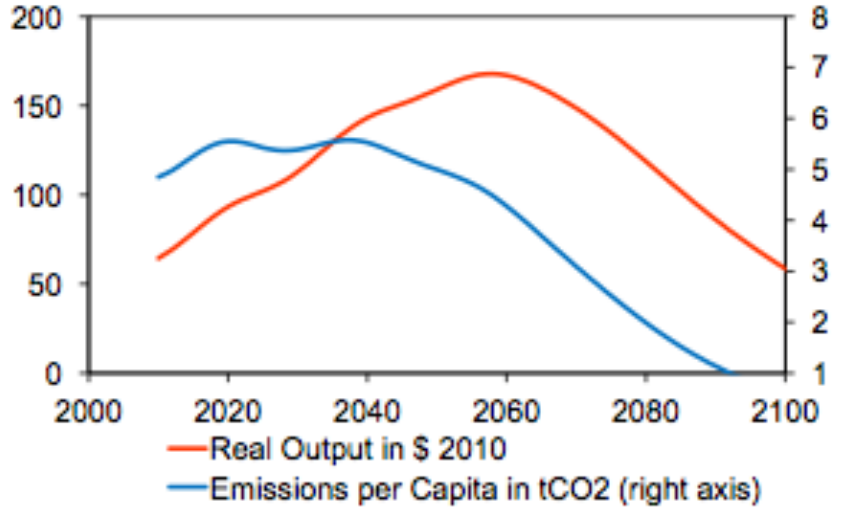
Figure: Trajectories of the main simulation outputs in the Dietz-Stern case.

Numerical Simulations

Combined Burke et al. and Dietz-Stern - Carbon Price 1 - Sensitivity







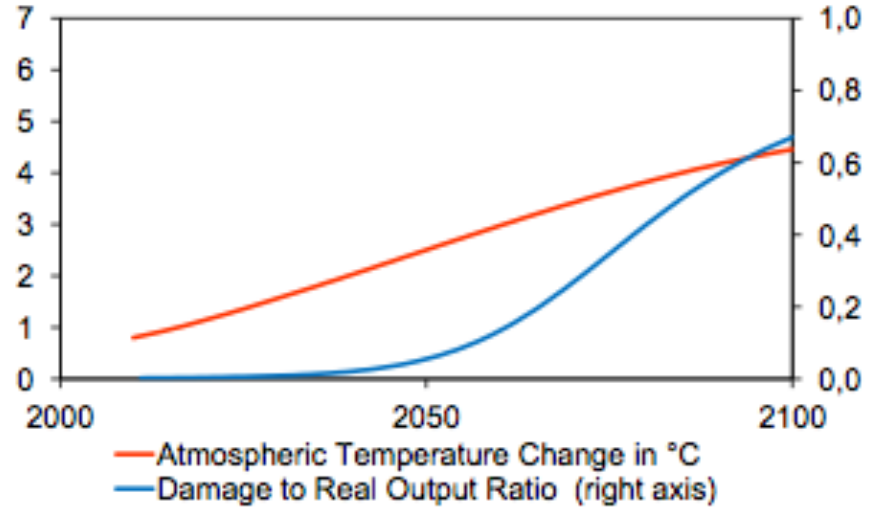


Figure: Trajectories of the main simulation outputs in the combined Burke-Dietz case - Carbon Price 1 - Climate Sensitivity of 6.

Numerical Simulations

Objective +1.5° C

	Sensitivity of 1.5		**Sensitivity of 2.9**	
	Init. price of 15	*Init. price of 80*	*Init. price of 15*	*Init. price of 80*
Price in 2015	18.58	86.27	65.50	144.32
Price in 2020	23.00	93.04	286.02	260.35
Price in 2050	82.93	146.35	xxx	xxx

Table: Price in order to prevent the temperature anomaly to reach the + 1.5° ceiling in 2100, prices are in 2005 US$/t CO_2.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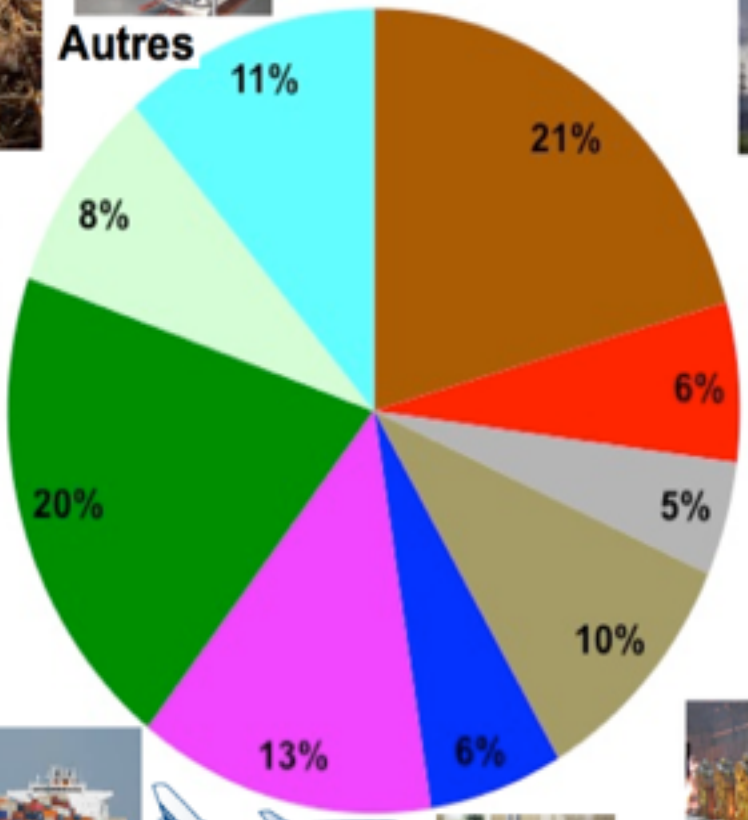
Thank you for your attention.
développeur d'avenirs durables

Déforestation

Autres

Centrales à charbon

Agriculture



Centrales électriques gaz/oil

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?

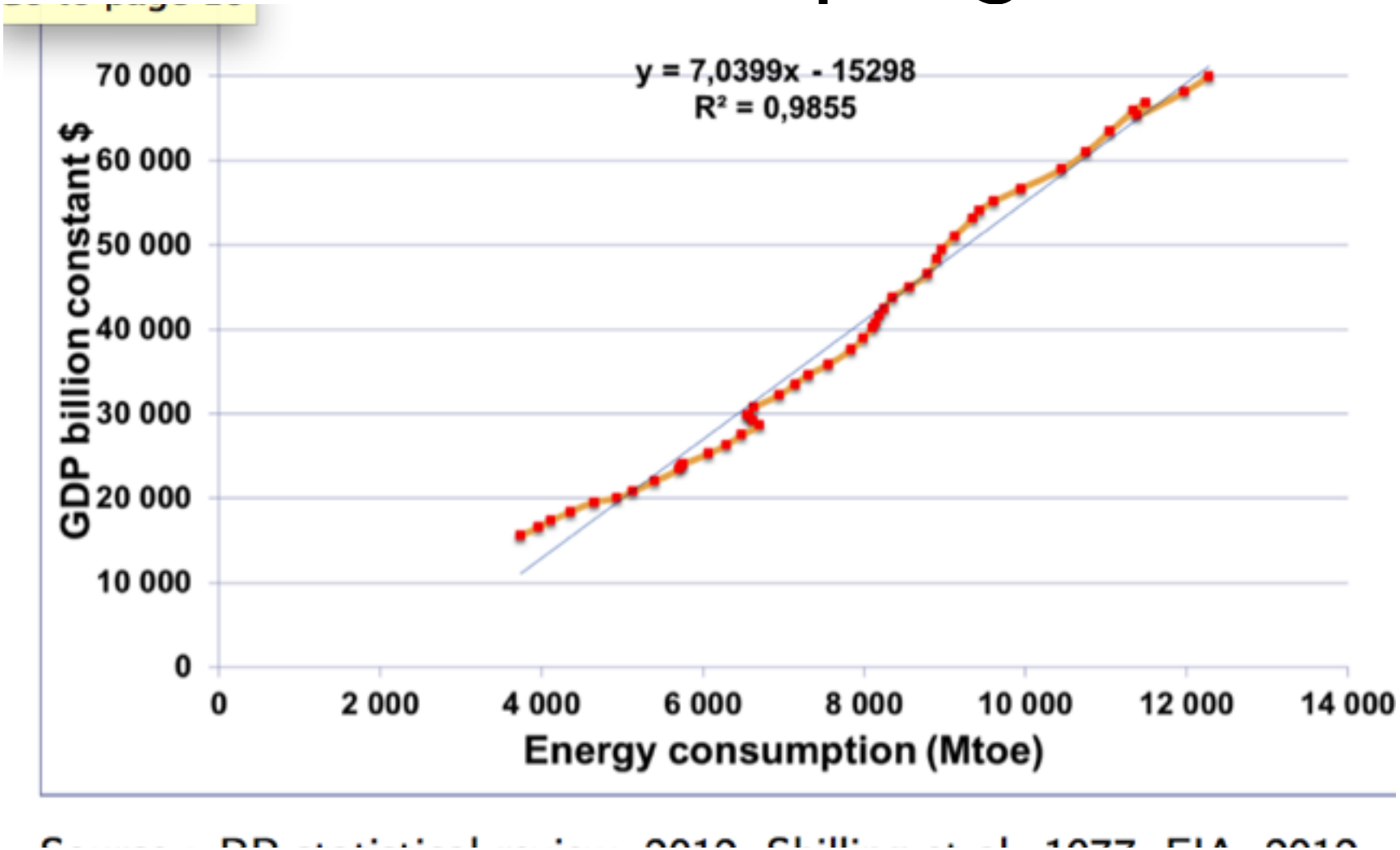
- Kaya's equation:

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

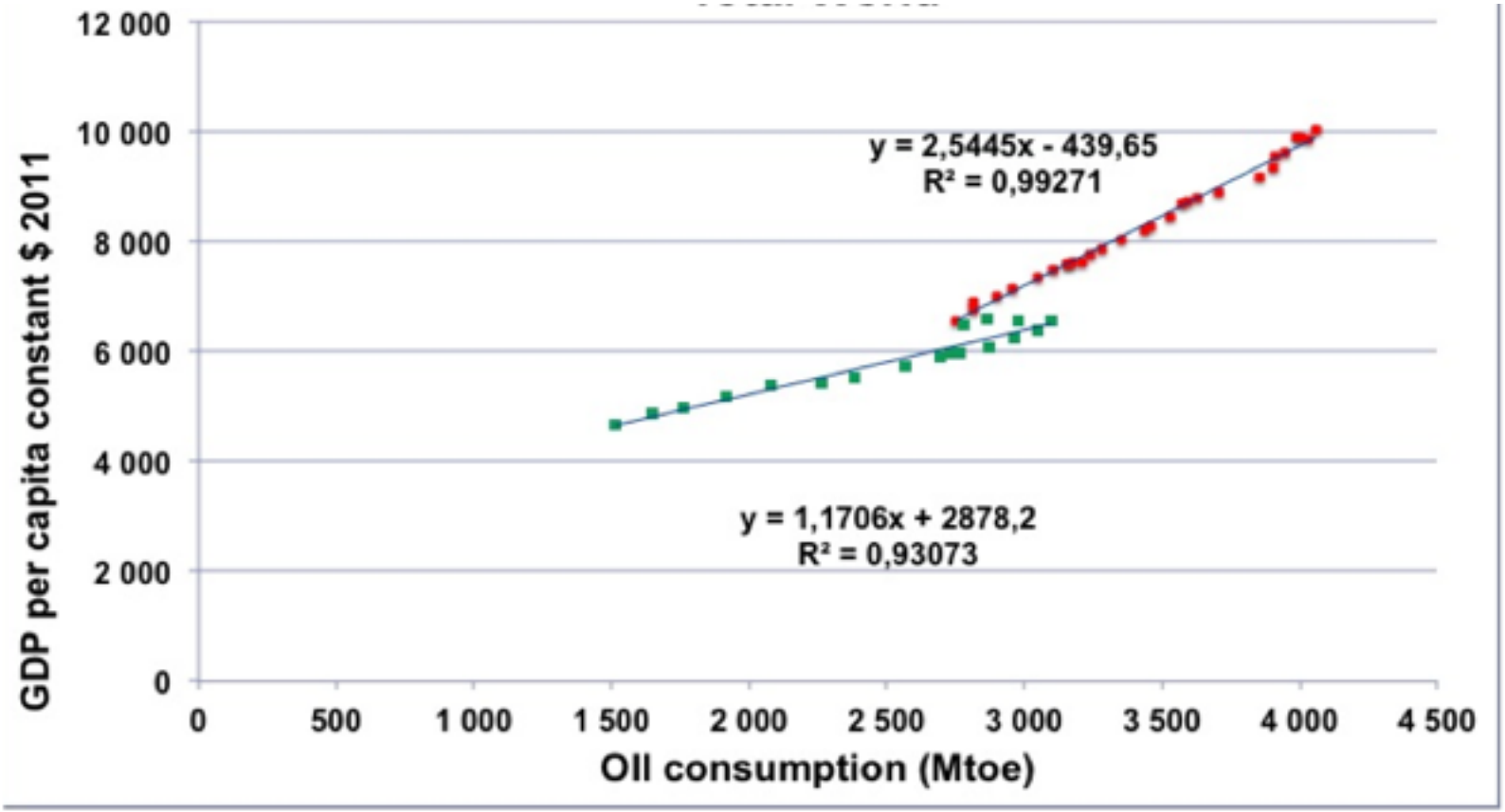
$$\Delta \ln \frac{Y_t}{N_t} = \Delta \ln \frac{E_t}{N_t} + \Delta \ln \frac{Y_t}{E_t} \qquad (2)$$

- 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)

Decoupling? (II)



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

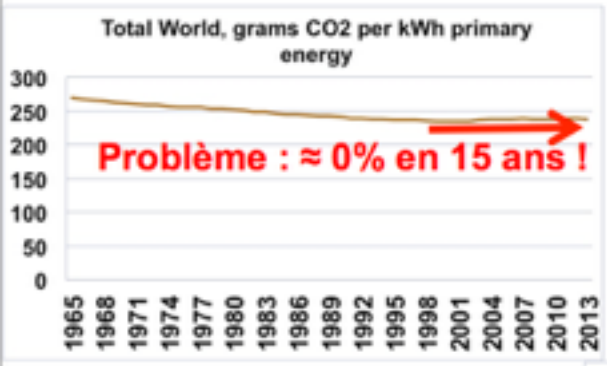
L'équation de Kaya :

A diviser par 3 d'ici 2050…

et le sera !

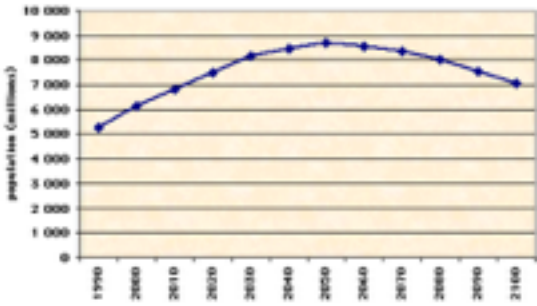
$$CO_2 = \frac{CO_2}{TEP} * \frac{TEP}{PIB} * \frac{PIB}{POP} * POP$$

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



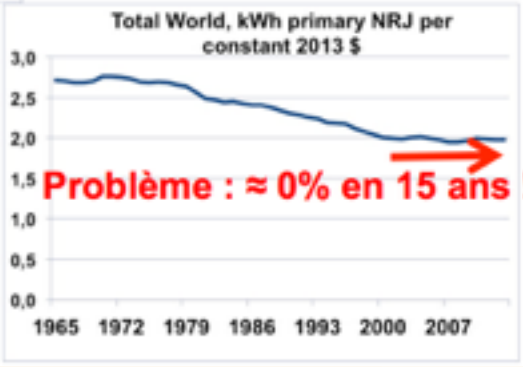
Problème : ≈ 0% en 15 ans !

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



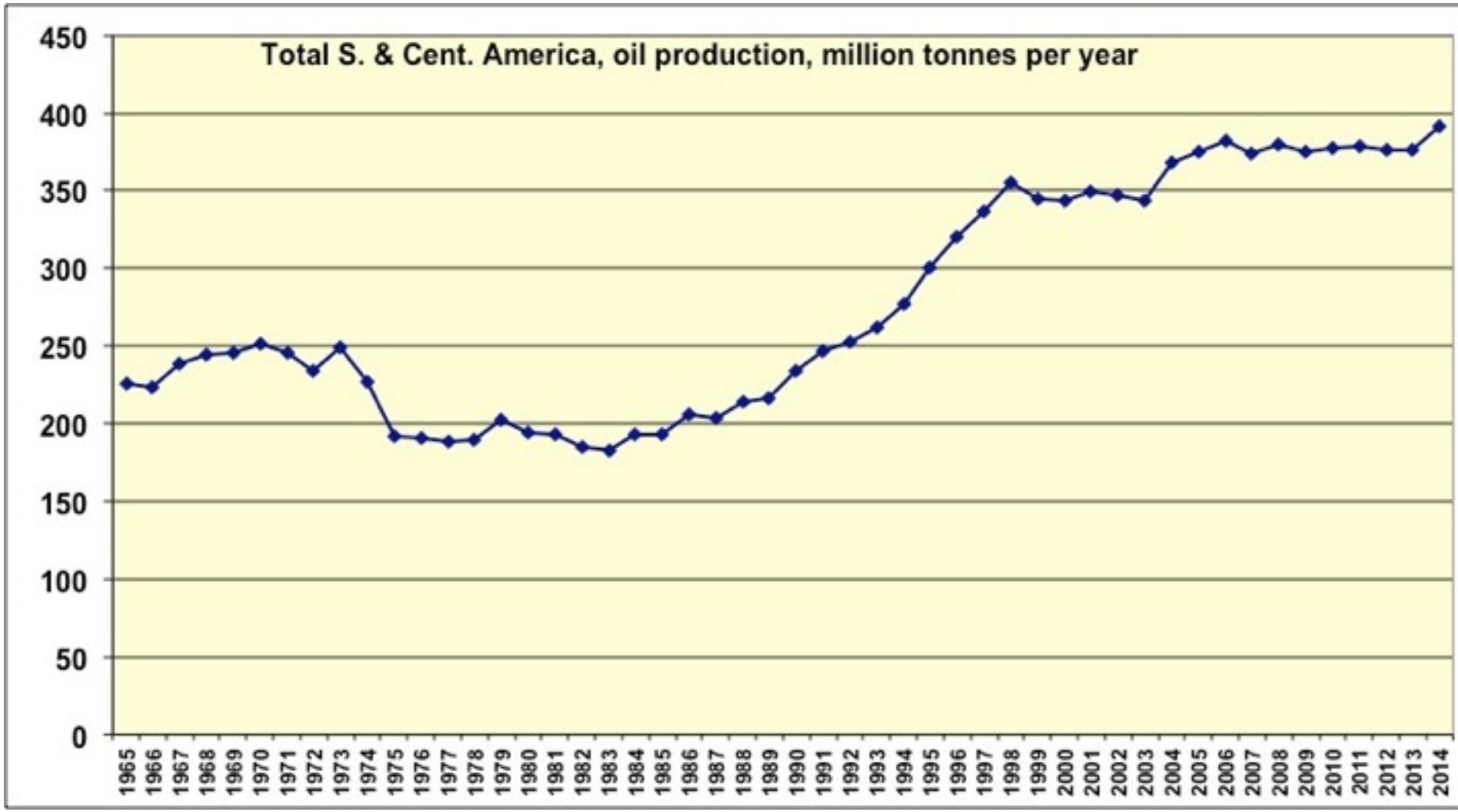
+ 25% d'ici 2050 ?

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



Problème : ≈ 0% en 15 ans !

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


Total S. & Cent. America, oil production, million tonnes per year
450
400
350
300
250
200
150
100
50
0
1965
1966
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1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
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2011
2012
2013
2014

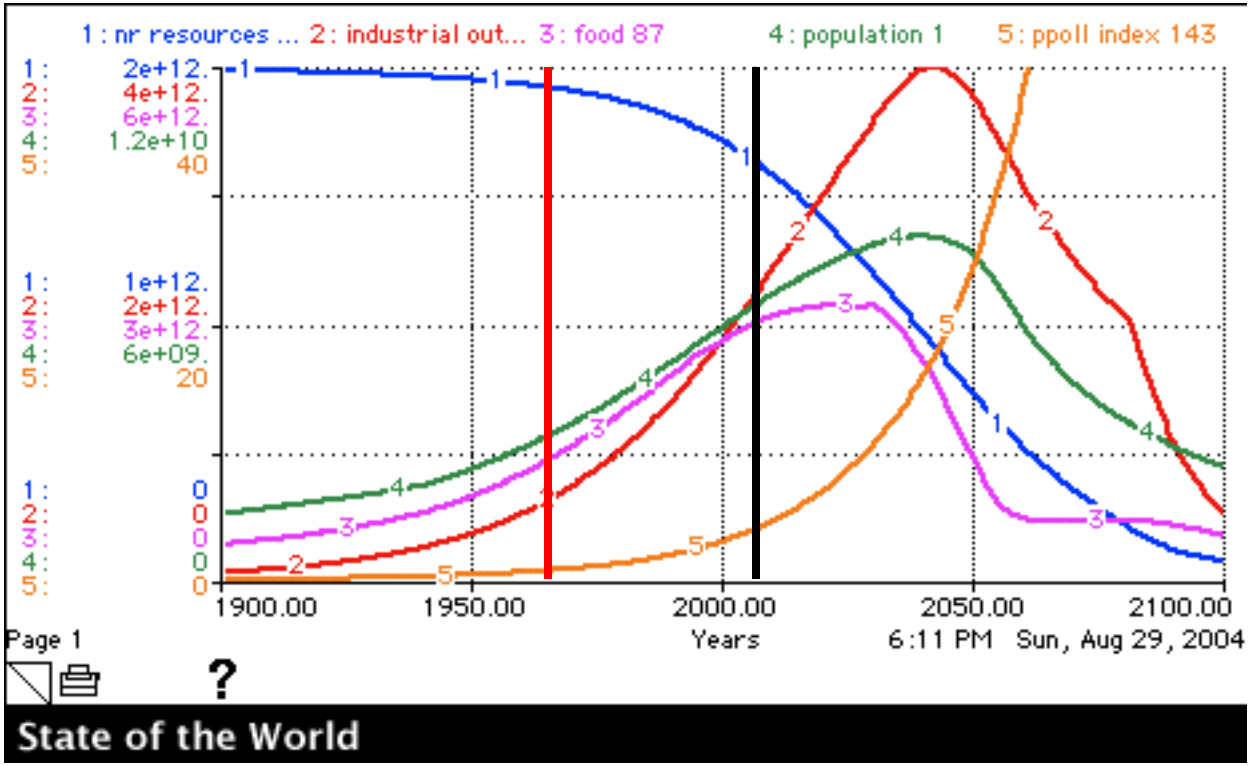
Peak oil? Soon?

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

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

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



Pollution

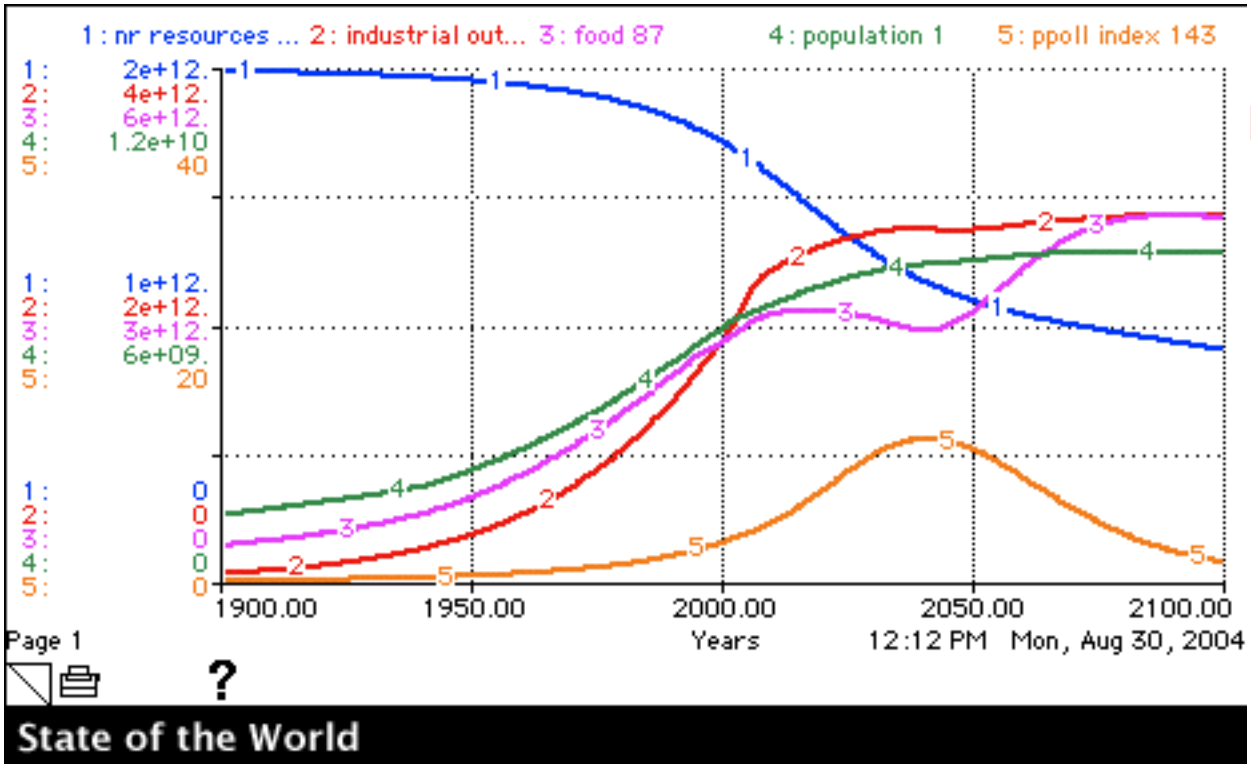
Ressources

Population

Industrial Output

Food

Meadows and the Energy shift



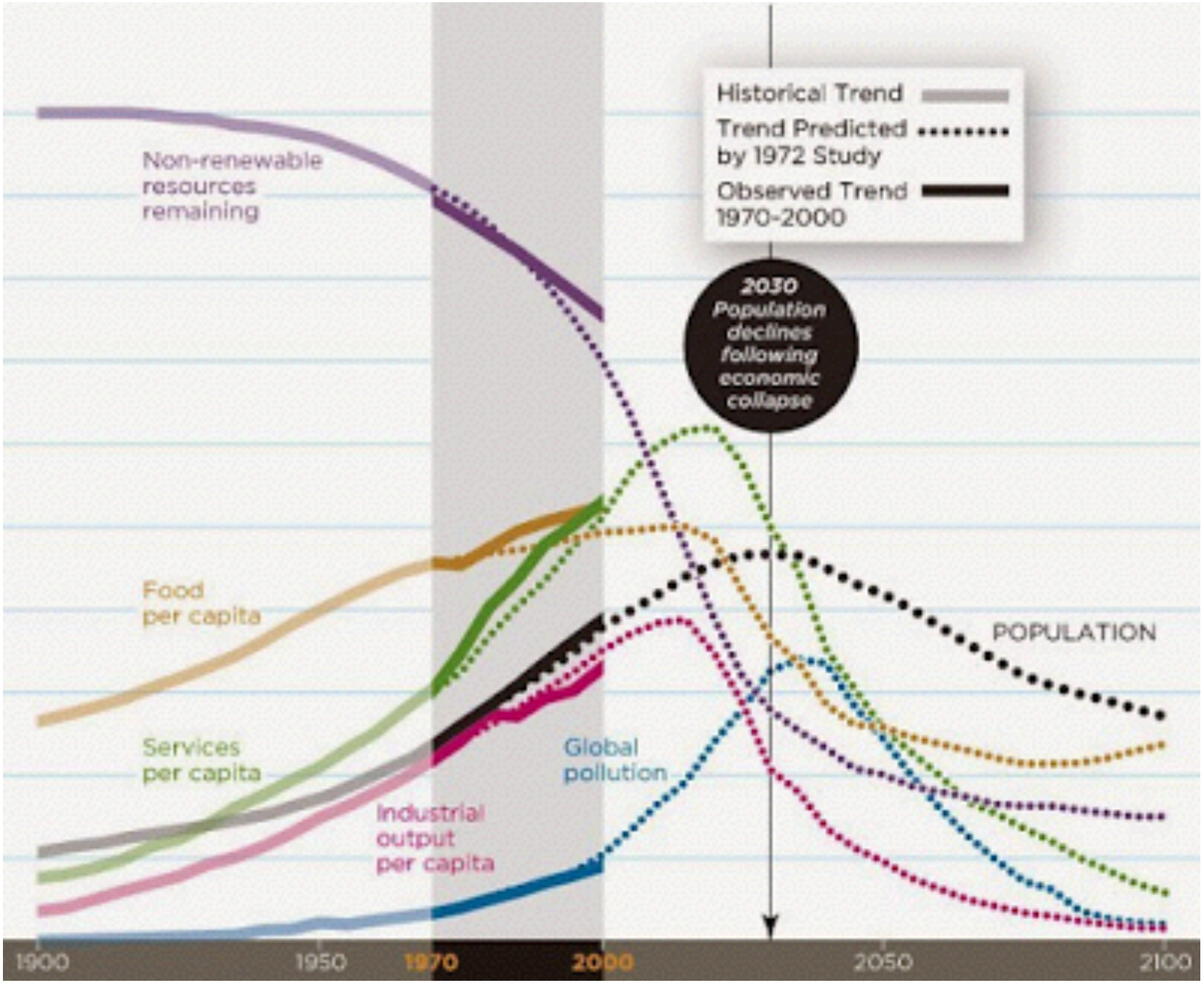
Industrial Output

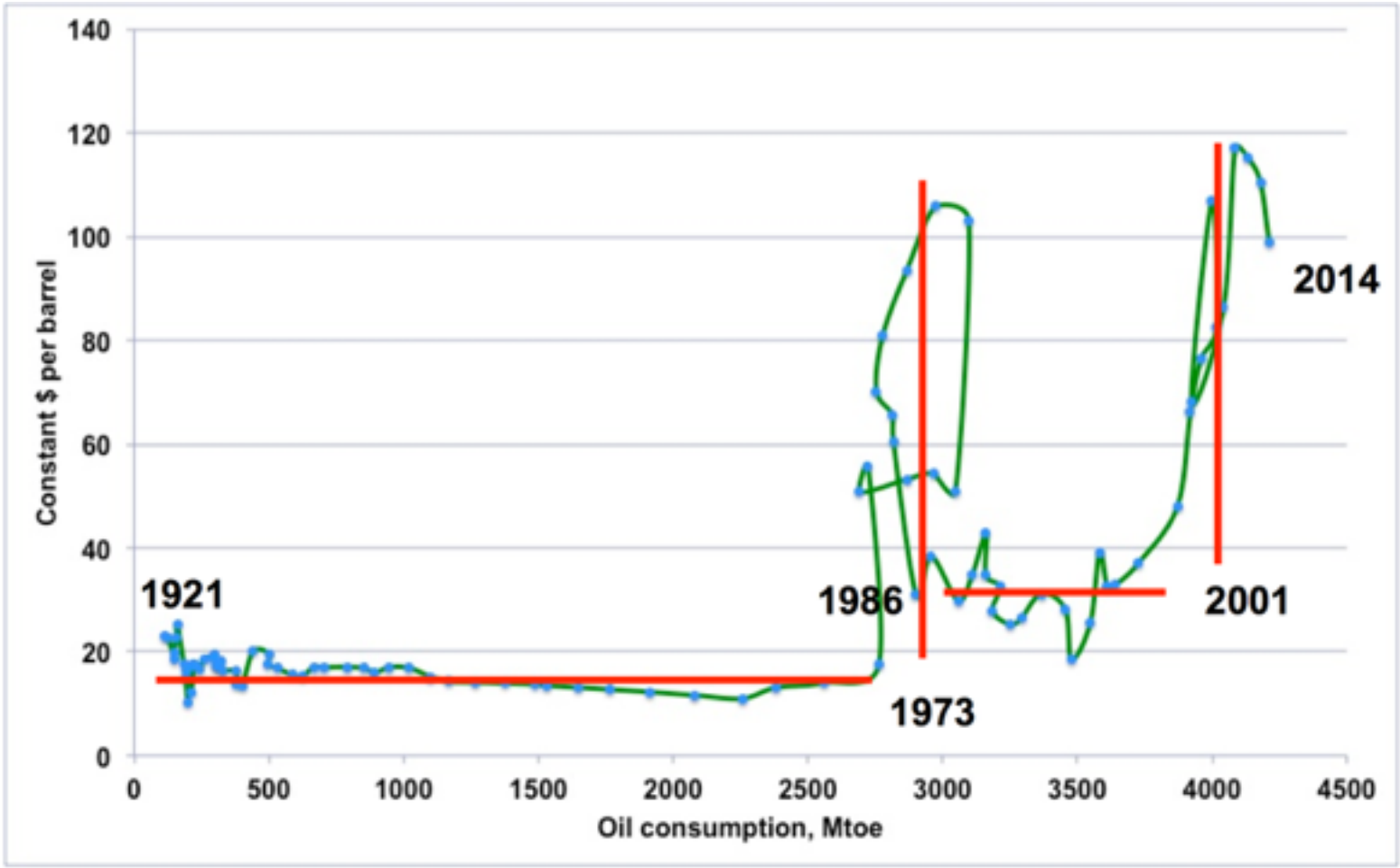
Food

Population

Resources

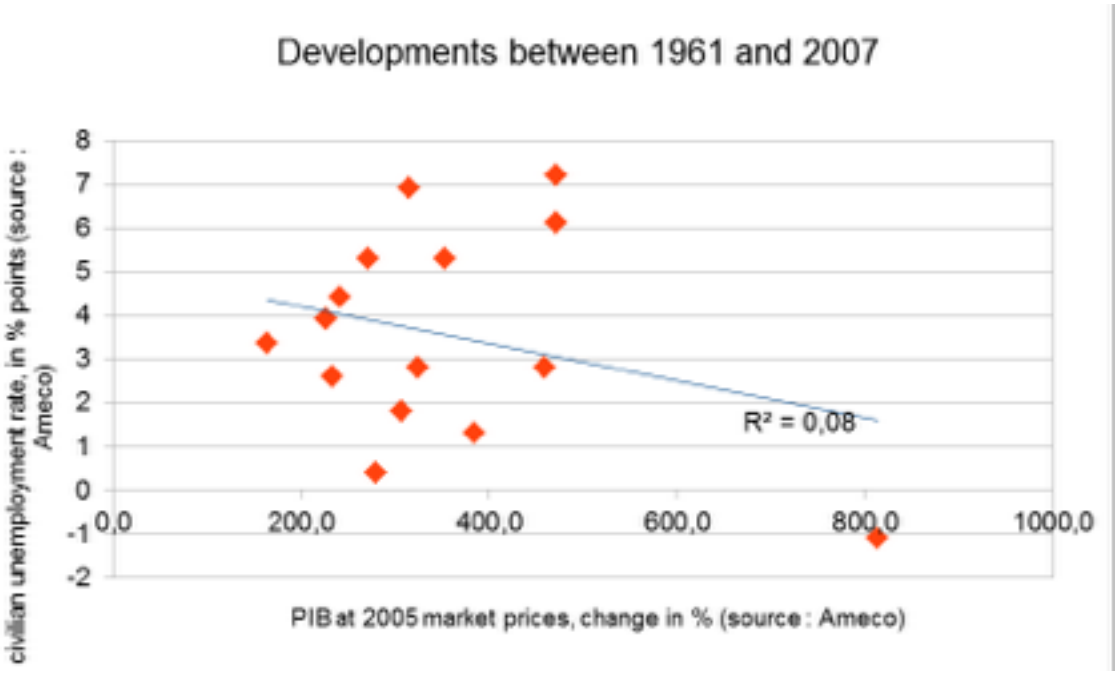
Pollution

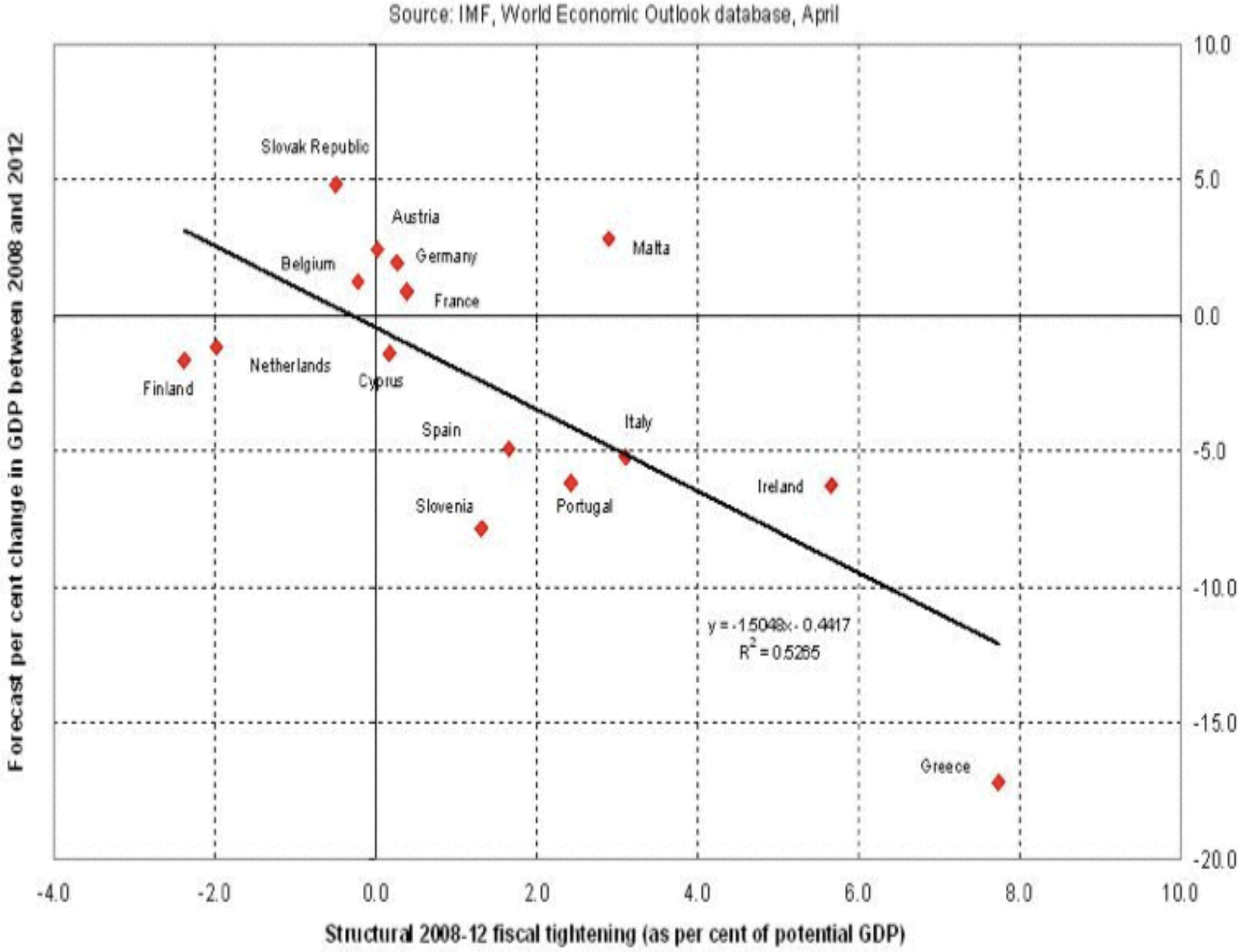

Historical Trend
Trend Predicted by 1972 Study
Observed Trend 1970-2000
2030 Population declines following economic collapse
Non-renewable resources remaining
Food per capita
Services per capita
Industrial output per capita
Global pollution
POPULATION
1900
1950
1970
2000
2050
2100



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

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
Slovenia
Portugal
Ireland
Greece
y = -1.5048x - 0.4417
R2 = 0.5265
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

COMMONS

- Elinor Ostrom (Nobel 2009)

- Private good: excludable and rival consumption.
- Public good: Non excludable, non rival
- Club-commodity: Non rival, excludable
- Common: Rival, non excludable

- How to cooperate?

- Prisoners' dilemma
- John Roemer (Yale): Kantian equilibrium
- Jorgen Weibull: evolutionary game theory
- Escape from the *homo economicus* fiction.

- Examples:
- Forests
- seeds
- Halieutic fauna
- Bees
- DNDI
- Wikipedia
- free softwares
- Language
- Labour
- Money…

- Common= A ressource
- + community
- + regulation.

- Example: fisheries in Nzerekore.
- Counter-example: Euro zone.

- A renewed relationship to ownership

- David Graeber: Private ownership comes from… slavery (*Debt, the first 5000 years*)
- *Usus*, *fructus*, *abusus*
- Circular economy
- Economy of functionalities

- A ressource is not naturally a common or a private good.
- Political decision
- … which creates the community.

- Dardot and Laval, *Commun, la révolution du XXIème siècle*.

- What is the role of the state?
- To organise the political, social economic environment so as to favour the emergence of commons.
- Example: fighting against corruption.