

# **DÉVELOPPEMENT DURABLE, TROP TARD – DÉVELOPPEMENT, GROS DÉFI**

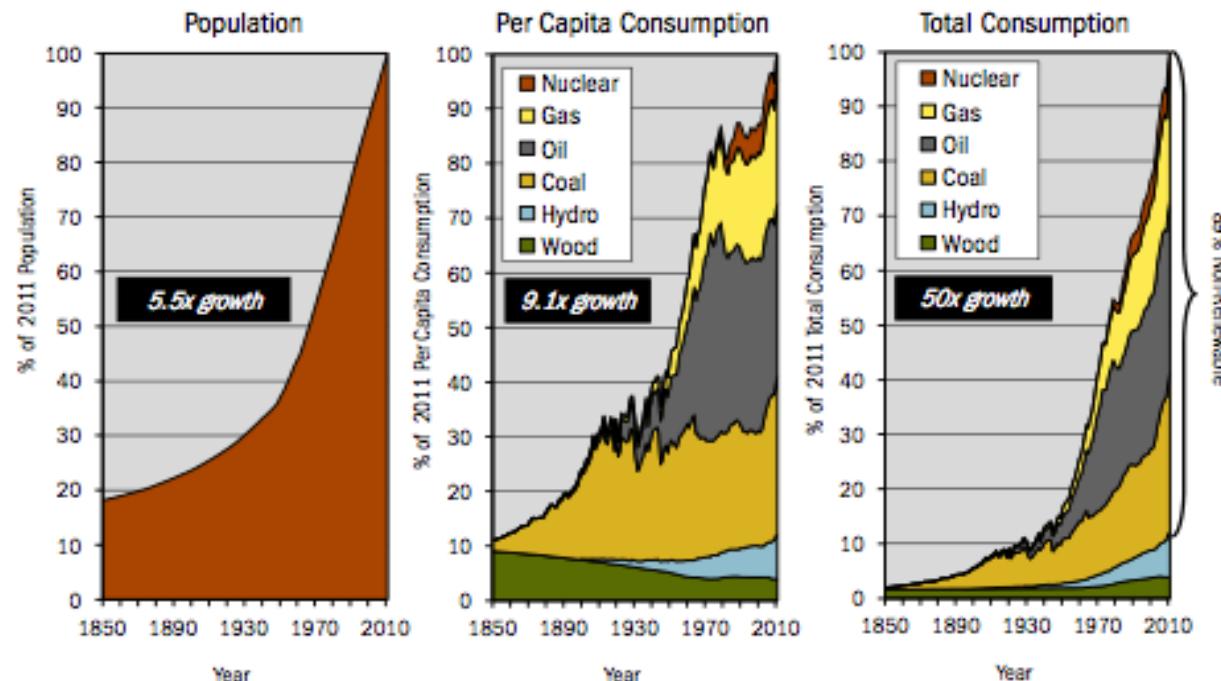
**NOTES POUR LA JOURNÉE D'ENVIRONNEMENT CANADA SUR  
LE DÉVELOPPEMENT DURABLE**

**MONTRÉAL 19 MARS 2013**

**HARVEY L. MEAD**  
**[www.harveymead.org](http://www.harveymead.org)**

# DÉVELOPPEMENT NON DURABLE

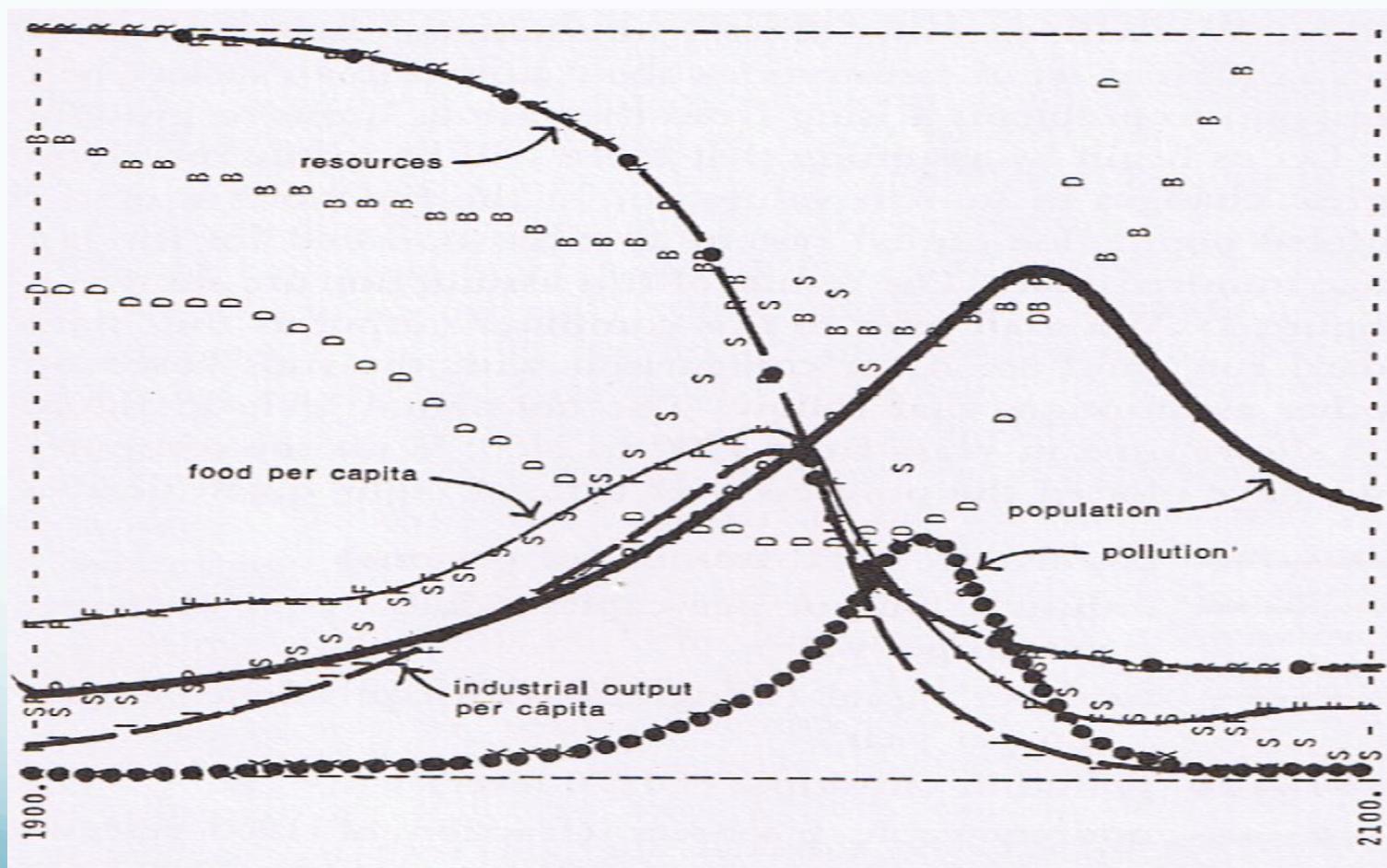
# CROISSANCE INSOUTENABLE



**Figure 1. World population, per capita-, and total-energy consumption by fuel as a percentage of 2011 consumption, 1850-2011.<sup>2</sup>**

J. David Hughes, *Drill, Baby, Drill: Can Unconventional Fuels Usher in a New Era of Energy Abundance*, Post Carbon Institute, 2013, p.4

# L'ÉCHÉANCIER N'EST PAS UNE DÉCOUVERTE - 1972



SOURCE: LIMITS TO GROWTH 1972

# **BRUNDTLAND 1985-1987**

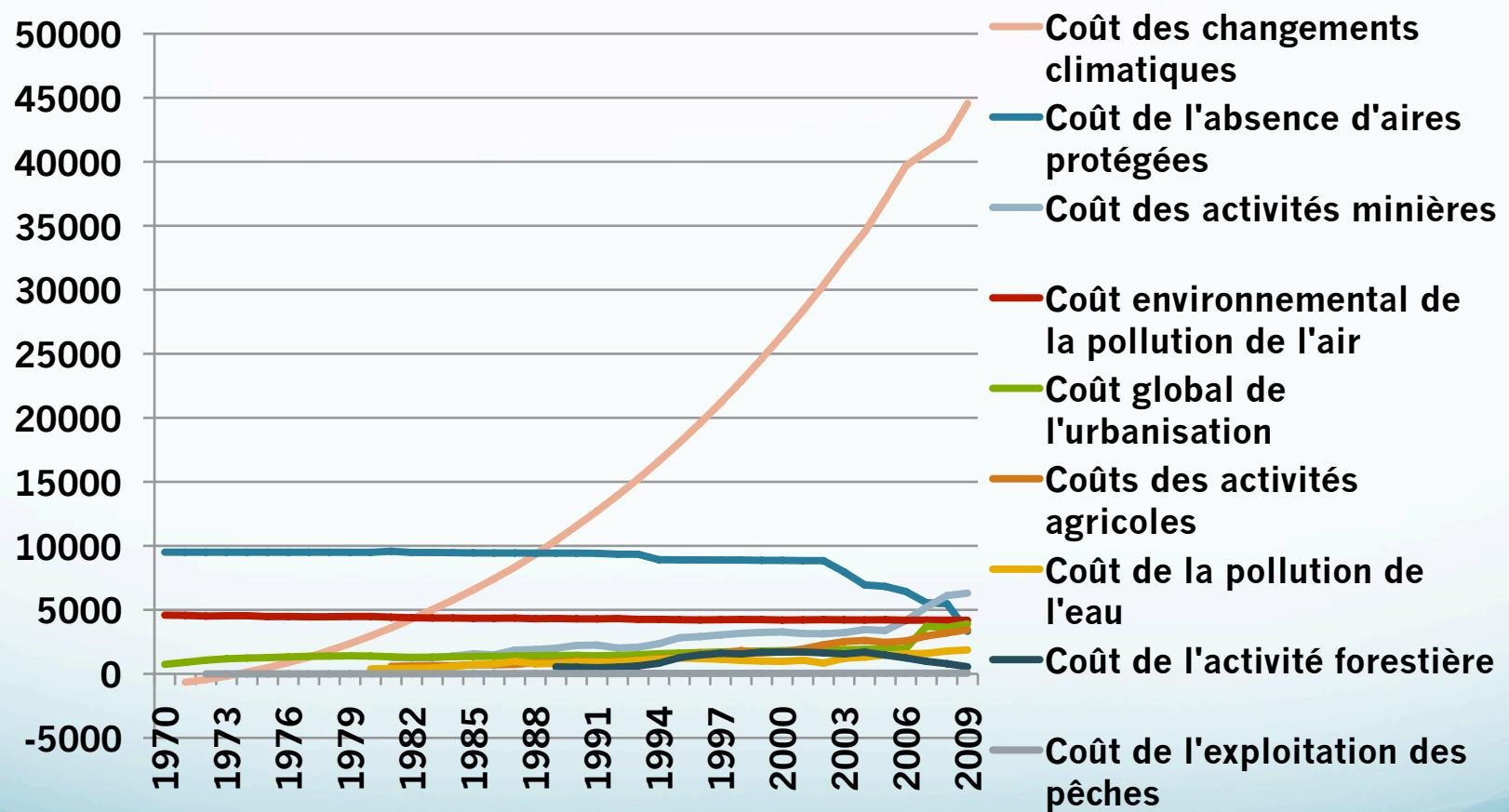
- LE DÉVELOPPEMENT DURABLE N'EST PAS SEULEMENT L'ENVIRONNEMENT, C'EST LE DÉVELOPPEMENT
- PENDANT LES ANNÉES 1980, C'ÉTAIT IMAGINABLE DE PENSER POUVOIR MAINTENIR SON NIVEAU DE VIE *ET Y INTÉGRER LES CONTRAINTES ENVIRONNEMENTALES*
- RENDUS AUX ANNÉES 2010, IL N'EST PLUS IMAGINABLE – NOUS AVONS BESOIN D'AUTRES PLANÈTES DEPUIS 1985, ET CELA AVEC LES TROIS QUARTS DE L'HUMANITÉ DANS LA PAUVRETÉ

# **MESURER PAR L'IPV LE DÉVELOPPEMENT AU QUÉBEC ENTRE 1970 ET 2009**

# **PIB ET IPV**

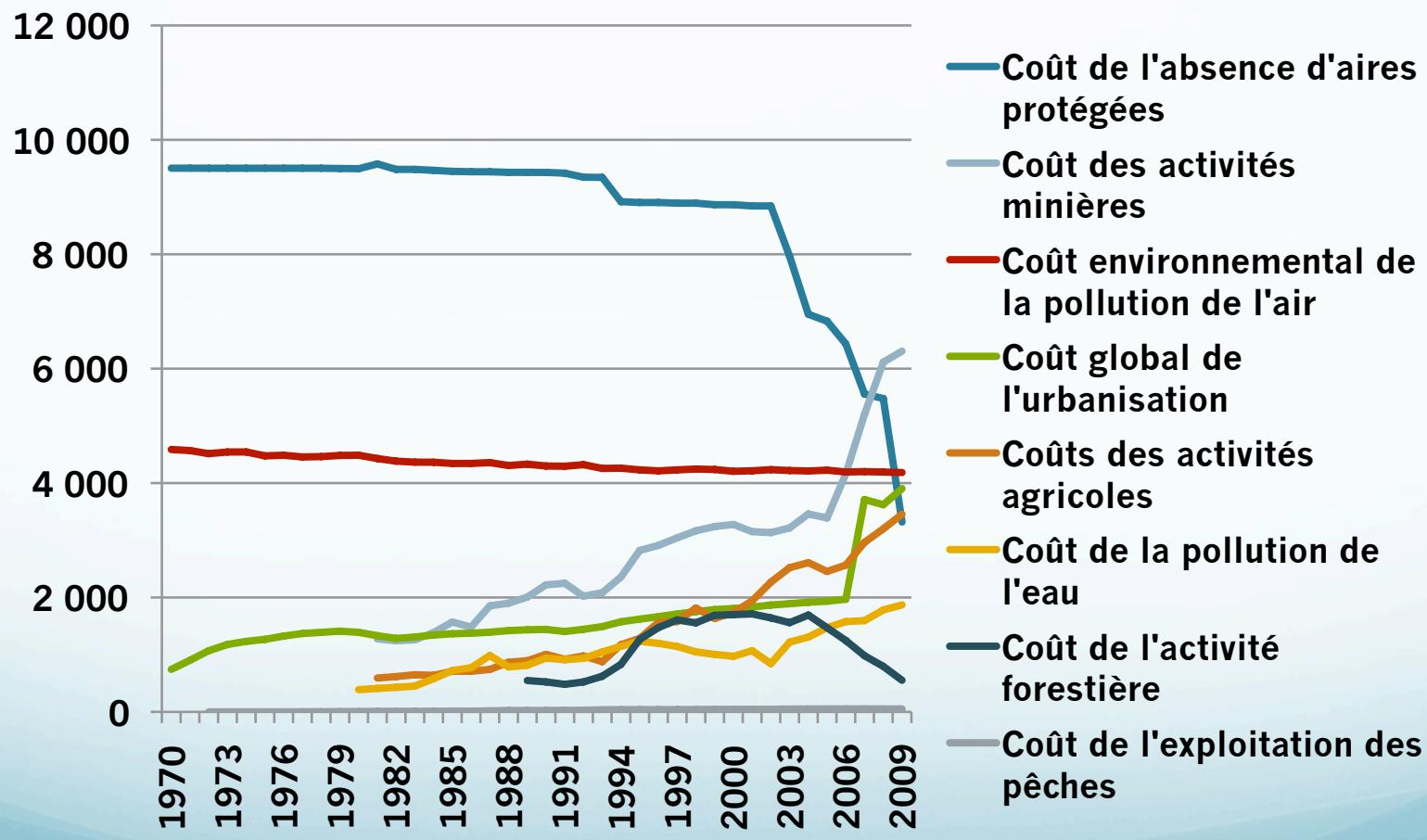
- **LE PIB, NOTRE MESURE PHARE, NE TIENT PAS COMPTE DU MONDE RÉEL.**
- **L'INDICE DE PROGRÈS VÉRITABLE (IPV) LE FAIT.**
- **CONCLUSION: LE PIB SURESTIME PAR TROIS FOIS NOTRE « PROGRÈS », SUIVANT LES INDICATIONS DE L'IPV.**

# IPV: LES COÛTS ENVIRONNEMENTAUX - 1

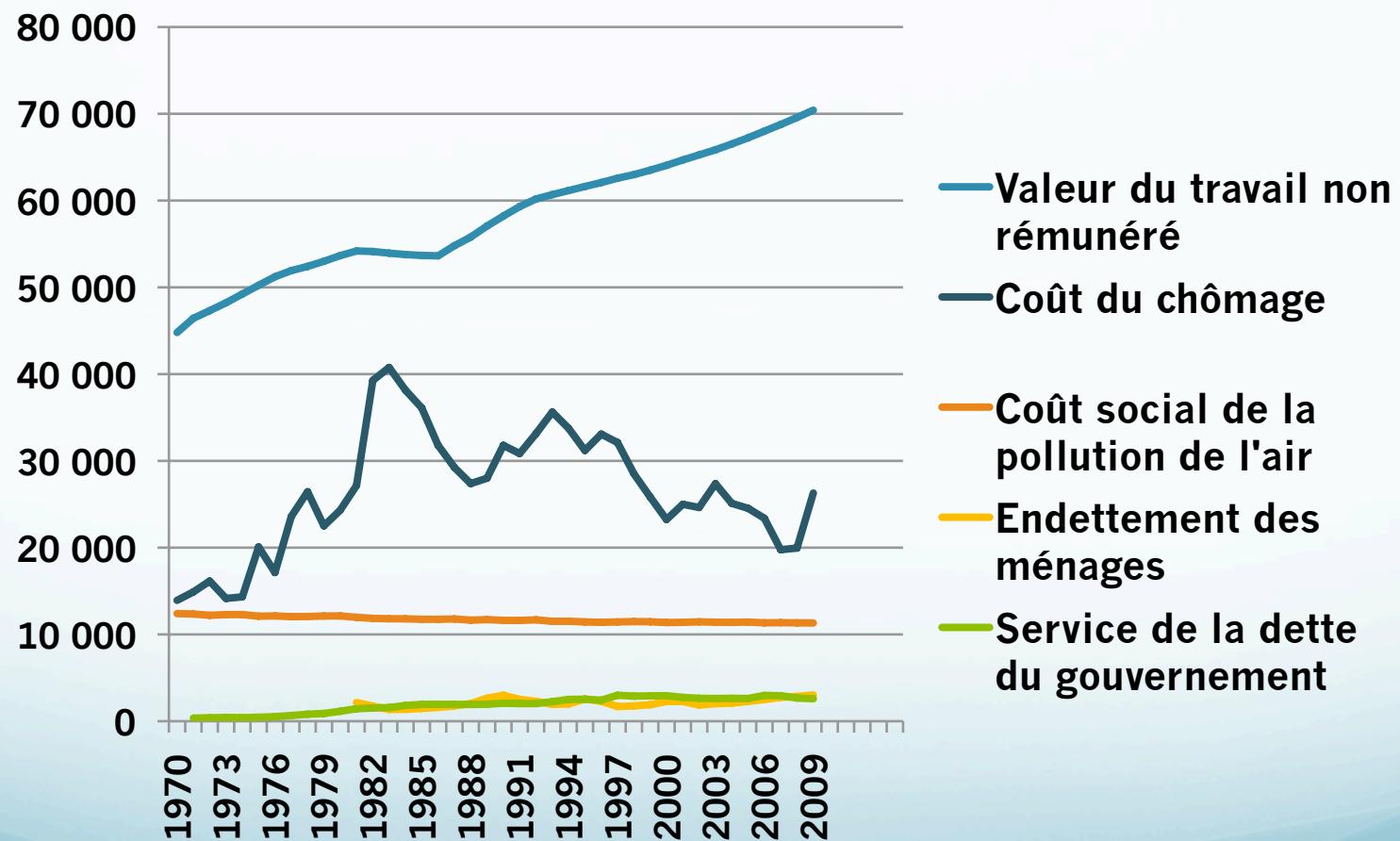


Harvey L. Mead, avec collab. de Thomas Marin, L'indice de progrès véritable: Quand l'économie dépasse l'écologie, MultiMondes, 2012 – même sources pour les graphiques suivants.

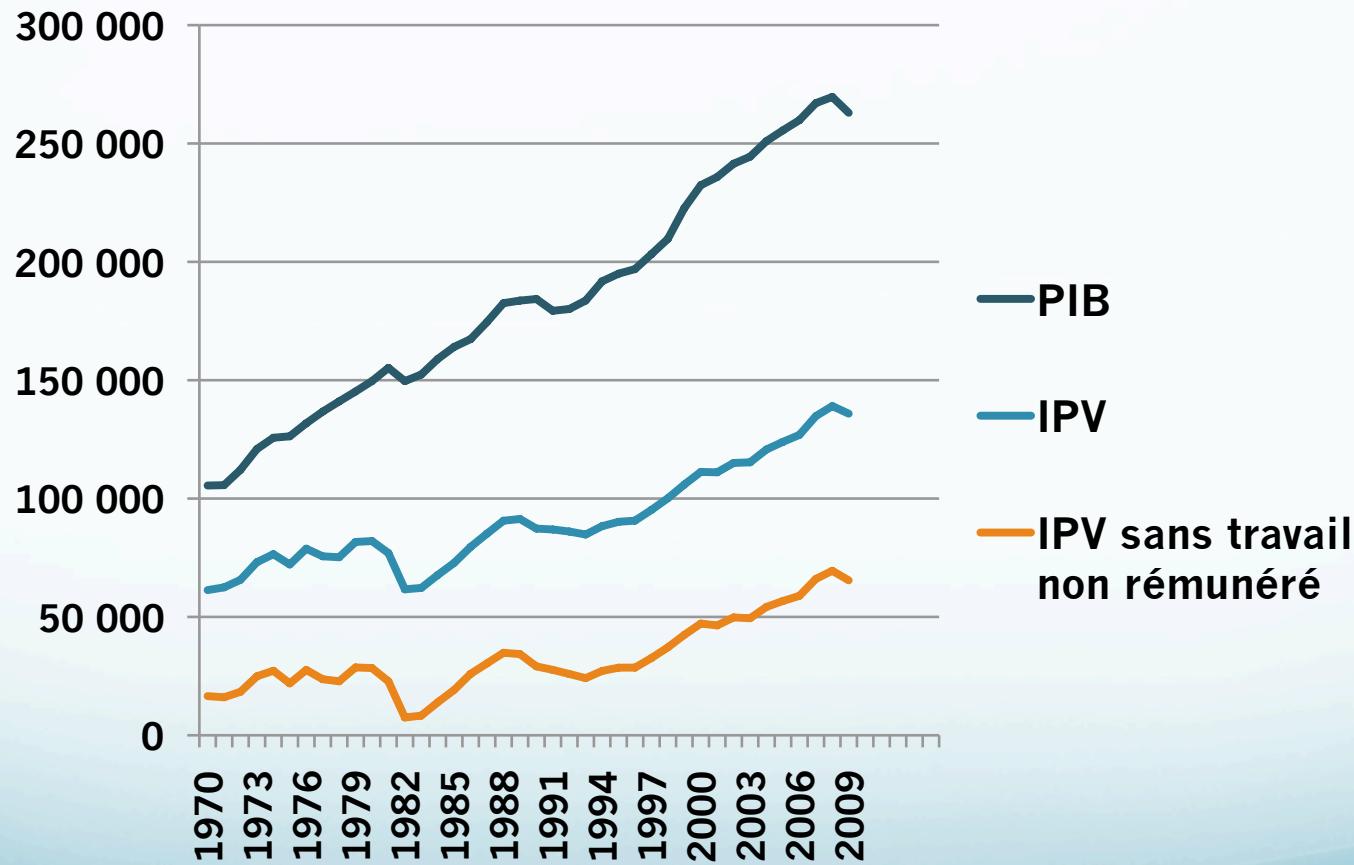
# IPV: LES COÛTS ENVIRONNEMENTAUX - 2



# IPV: LES BÉNÉFICES ET LES COÛTS SOCIAUX



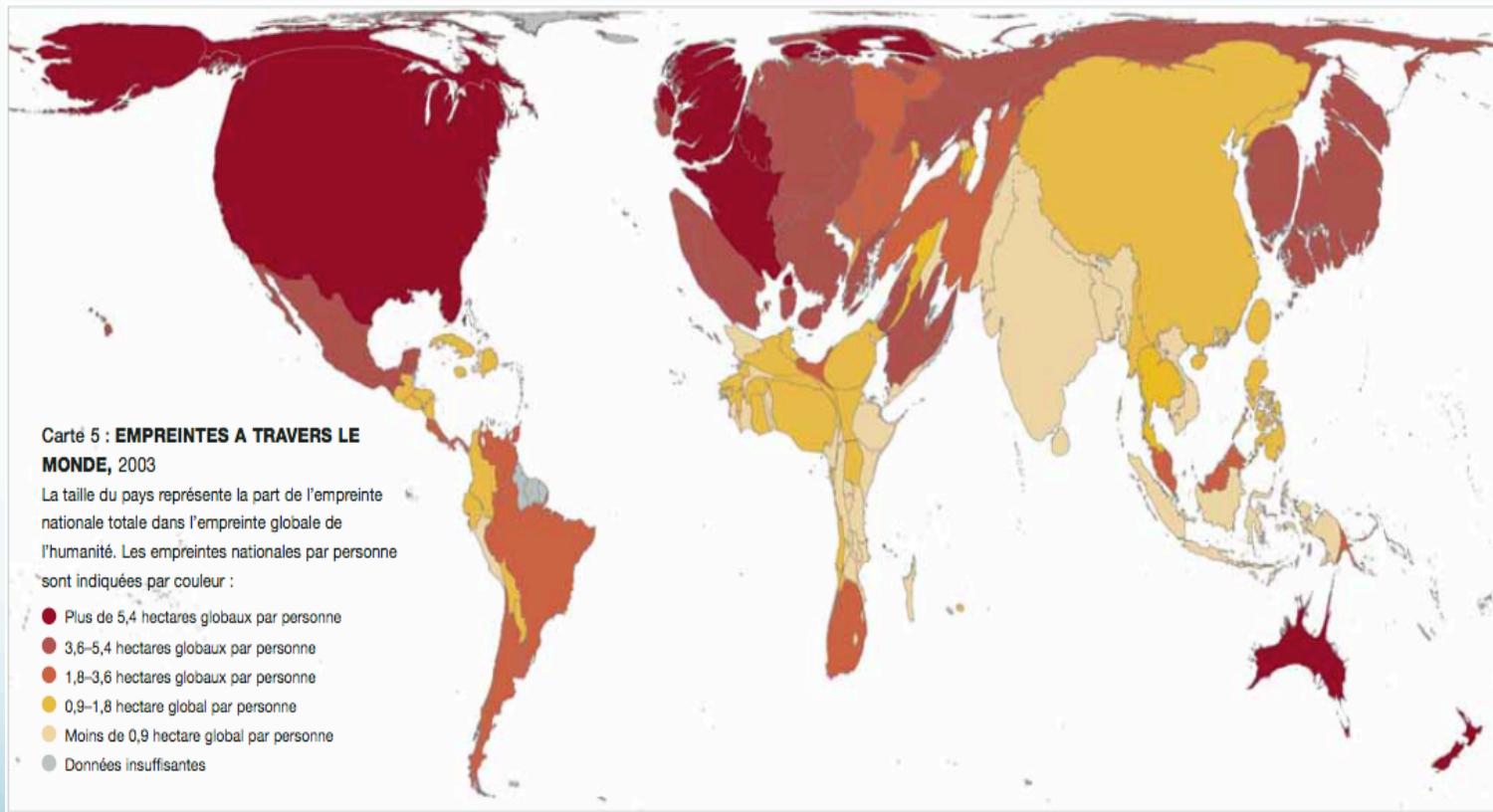
# ACTIVITÉ ÉCONOMIQUE (PIB) VS.DÉVELOPPEMENT (IPV)



# **DÉPASSEMENT DE CAPACITÉ DE SUPPORT ET INÉGALITÉS ENTRE HUMAINS**

**2013**

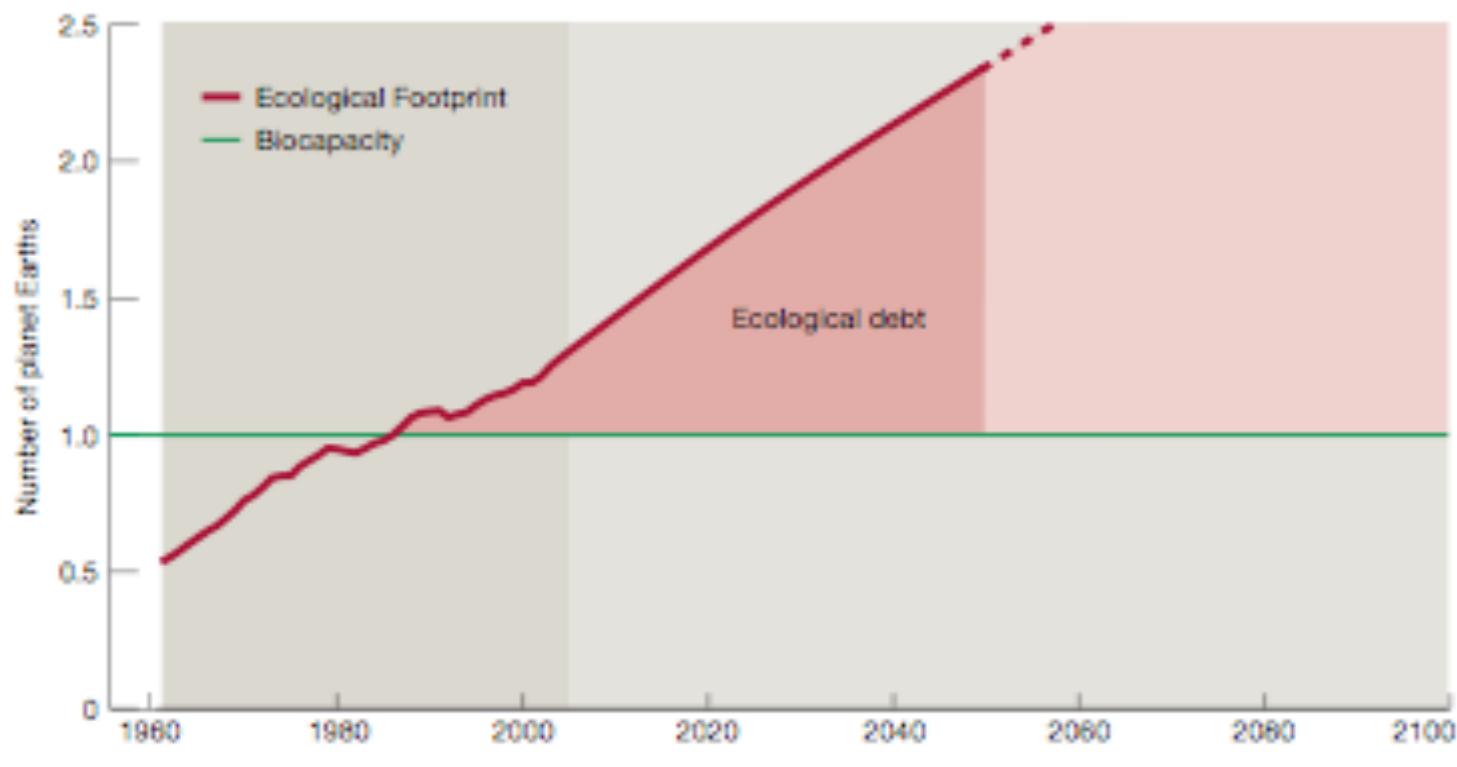
# UNE PLANÈTE ET DEMI



SOURCE: *Planète vivante 2006, WWF et Global Footprint Network*

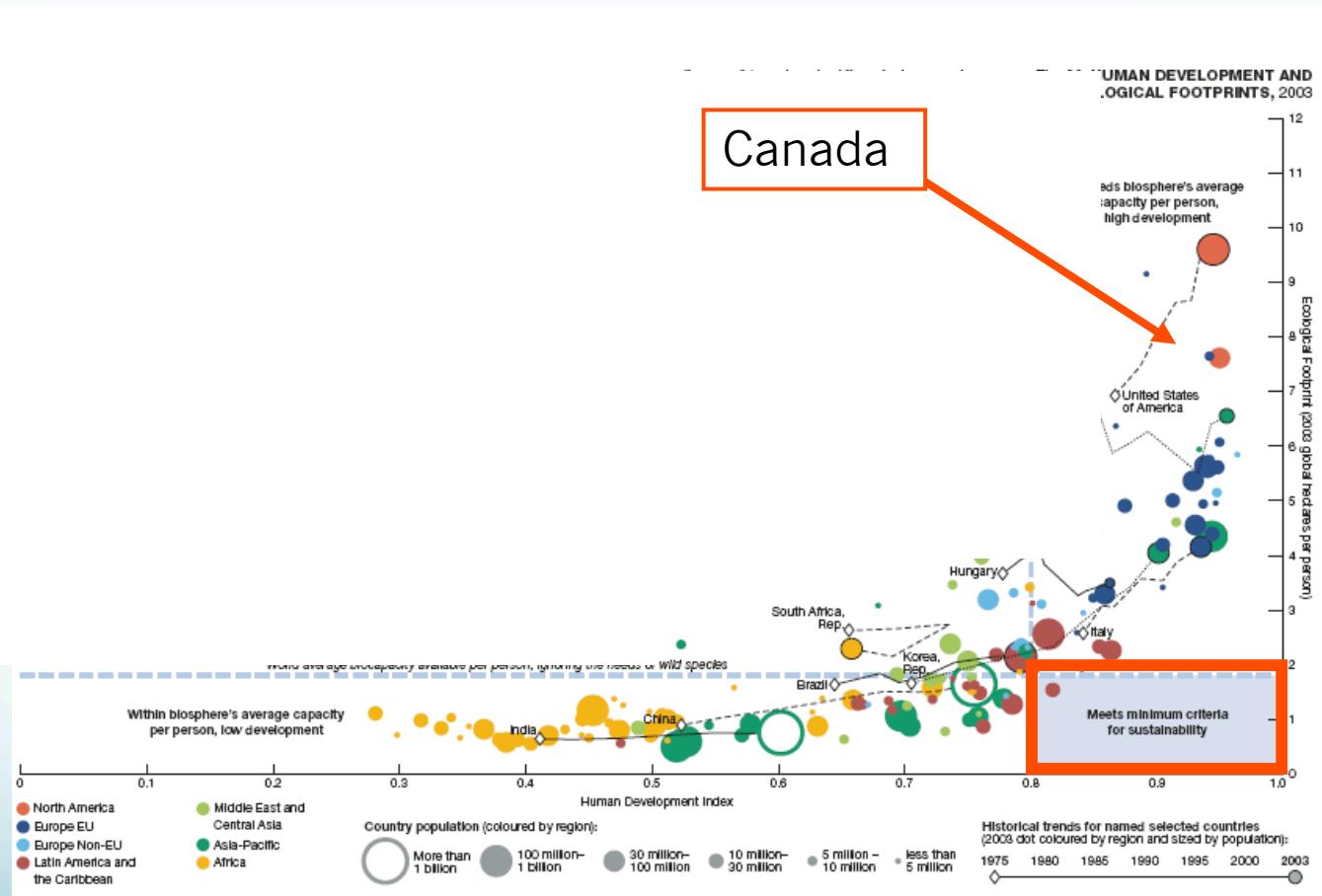
# L'EMPREINTE ÉCOLOGIQUE DE L'HUMANITÉ : 1,5 PLANÈTES

Fig. 31: BUSINESS-AS-USUAL SCENARIO AND ECOLOGICAL DEBT



Ibid.

# L'EMPREINTE ET L'IDH



# L'AVENIR DU DÉVELOPPEMENT

# PROJECTIONS PRIX POUR 33 RESSOURCES DE BASE

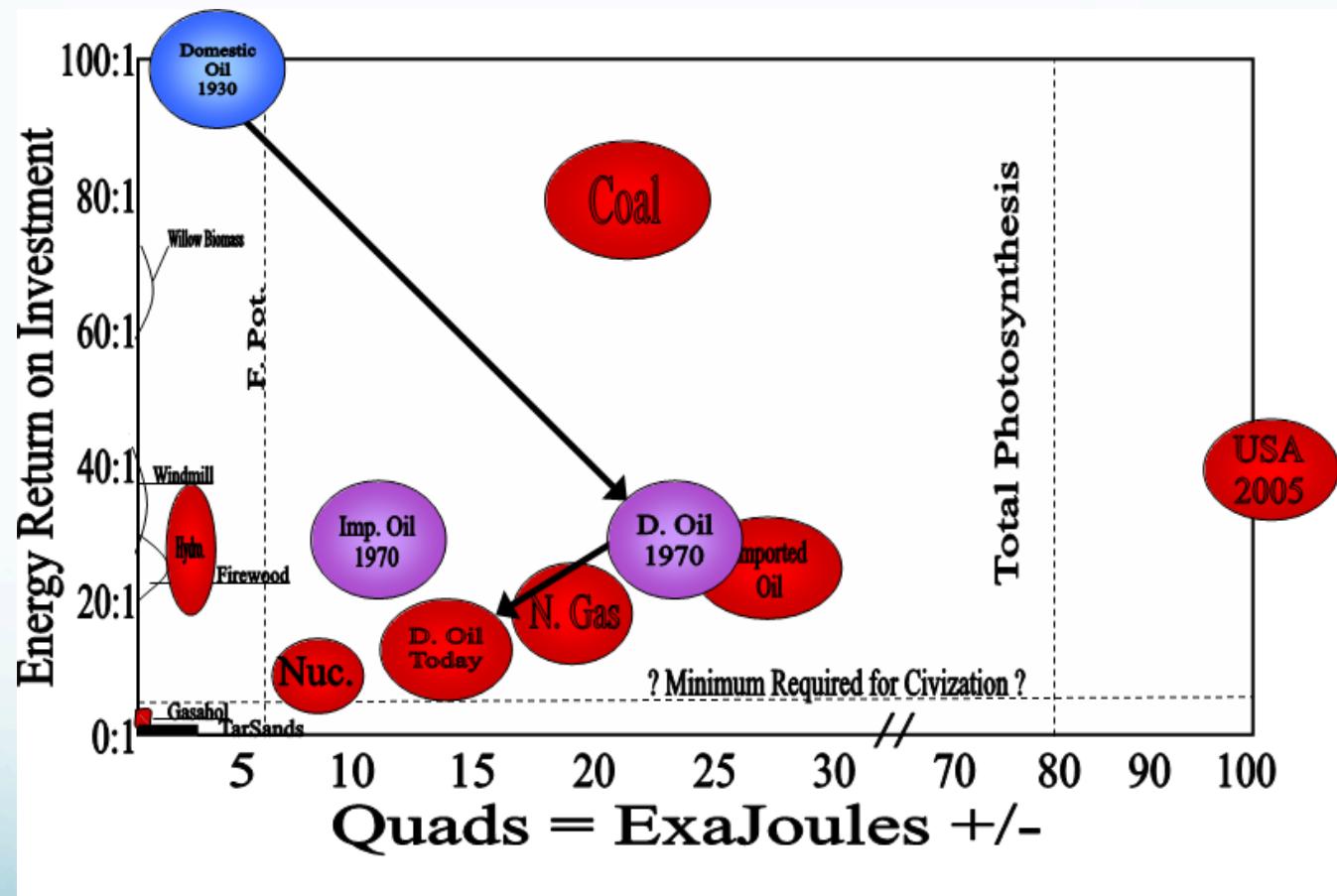


Note: The GMO commodity index is an index comprised of the following 33 commodities, equally weighted at initiation: aluminum, coal, coconut oil, coffee, copper, corn, cotton, diammonium phosphate, flaxseed, gold, iron ore, jute, lard, lead, natural gas, nickel, oil, palladium, palm oil, pepper, platinum, plywood, rubber, silver, sorghum, soybeans, sugar, tin, tobacco, uranium, wheat, wool, zinc.

Source: GMO As of 2/28/11

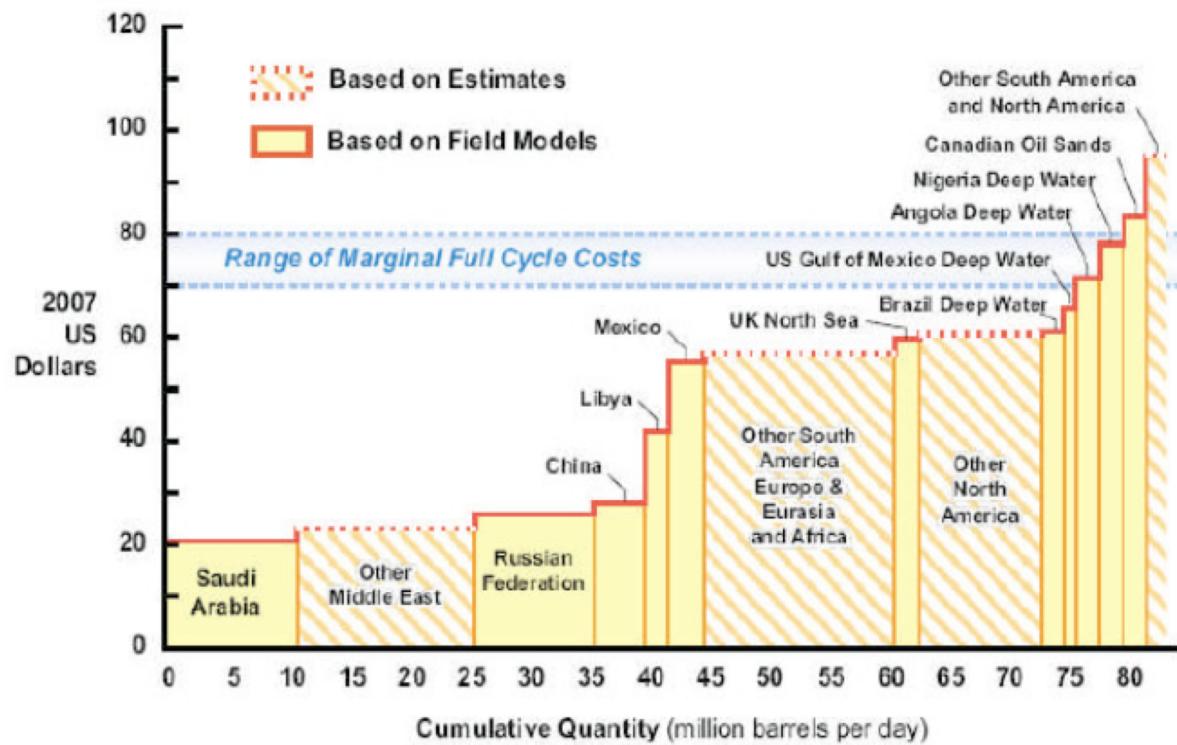
Source: Jeremy Grantham, Time to Wake Up: Days of Abundant Resources and Falling Prices Are Over Forever, 2011 - <http://thinkprogress.org/climate/2011/05/02/207994/grantham-must-re...-up-days-of-abundant-resources-and-falling-prices-are-over-forever/>

# ÉNERGIE: RETOUR SUR INVESTISSEMENT (ÉROI)



Hall, Balogh and Lambert, Peak Oil, Declining EROI and the New Economic Realities: New Limits to Growth?, SUNY, June 2012

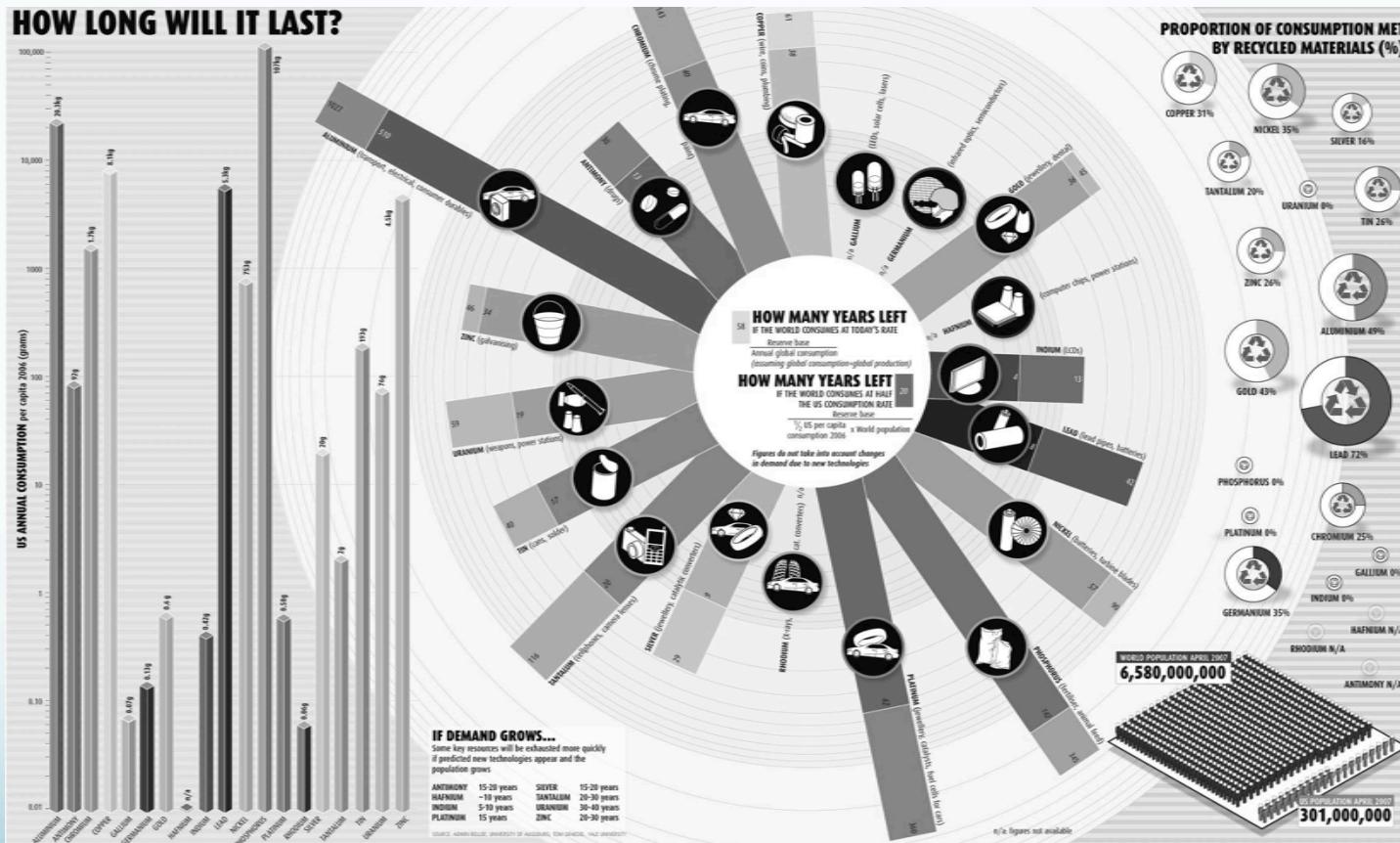
# GÉOGRAPHIE DES RÉCENTES EXPLOITATIONS



Source: Cambridge Economic Research Associates "Ratcheting Down: Oil and the Global Credit Crisis" October 2008

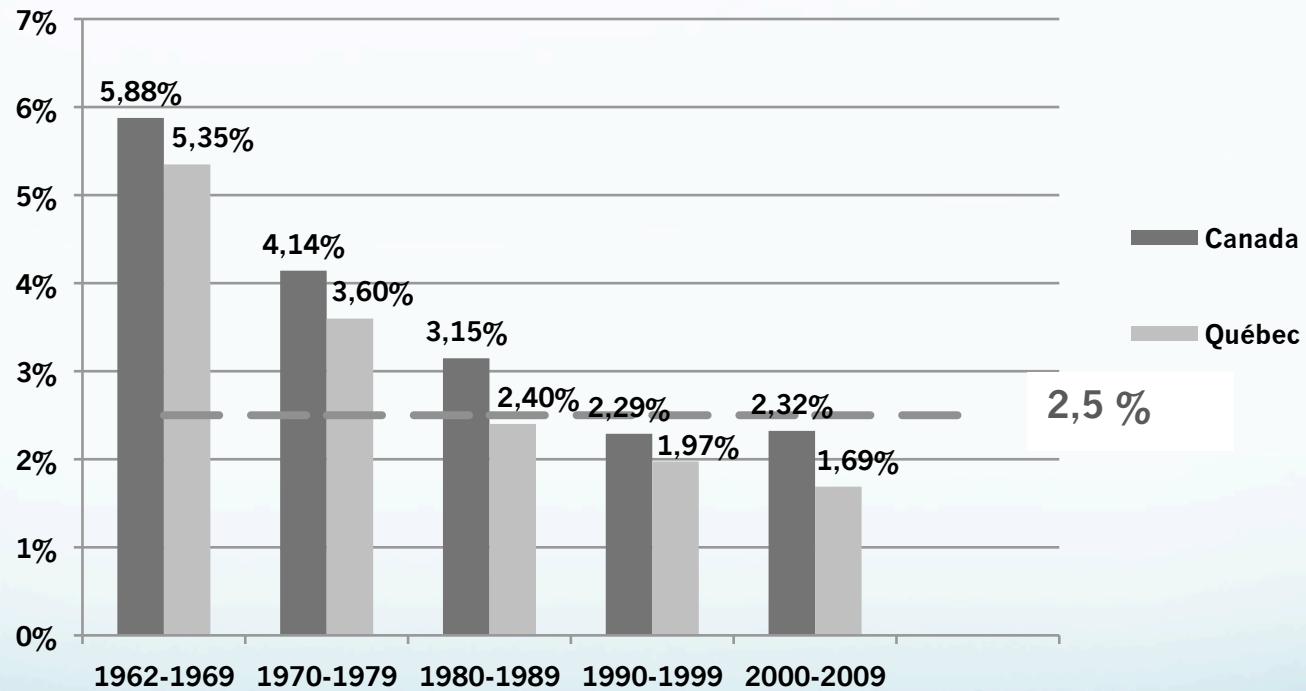
Ibid.

# MÉTAUX ET MINÉRAUX: DURÉE DE VIE (MROI)



Source: New Scientist, <http://www.newscientist.com/search?doSearch=true&query=%2bEarth%27s+natural+wealth%2b+an+audit+> David Cohen 23 May 2007

# BAISSE INÉLUCTABLE DE L'ACTIVITÉ ÉCONOMIQUE

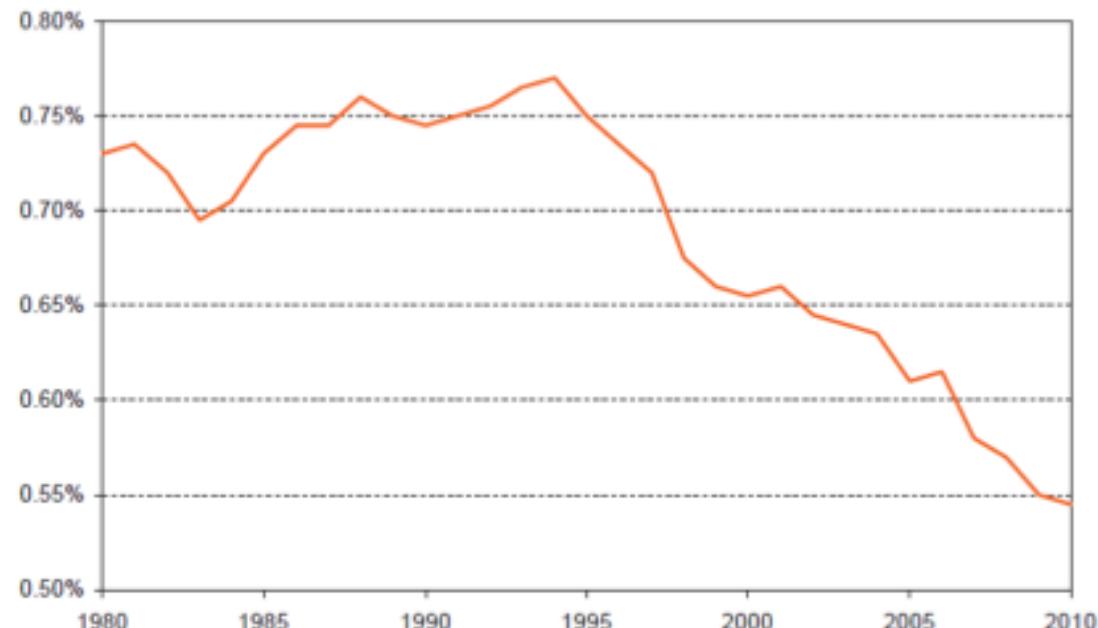


Tiré des données pour Mead, op.cit.

# CUIVRE : MARCHÉ DE LA CHINE?

Exhibit 8

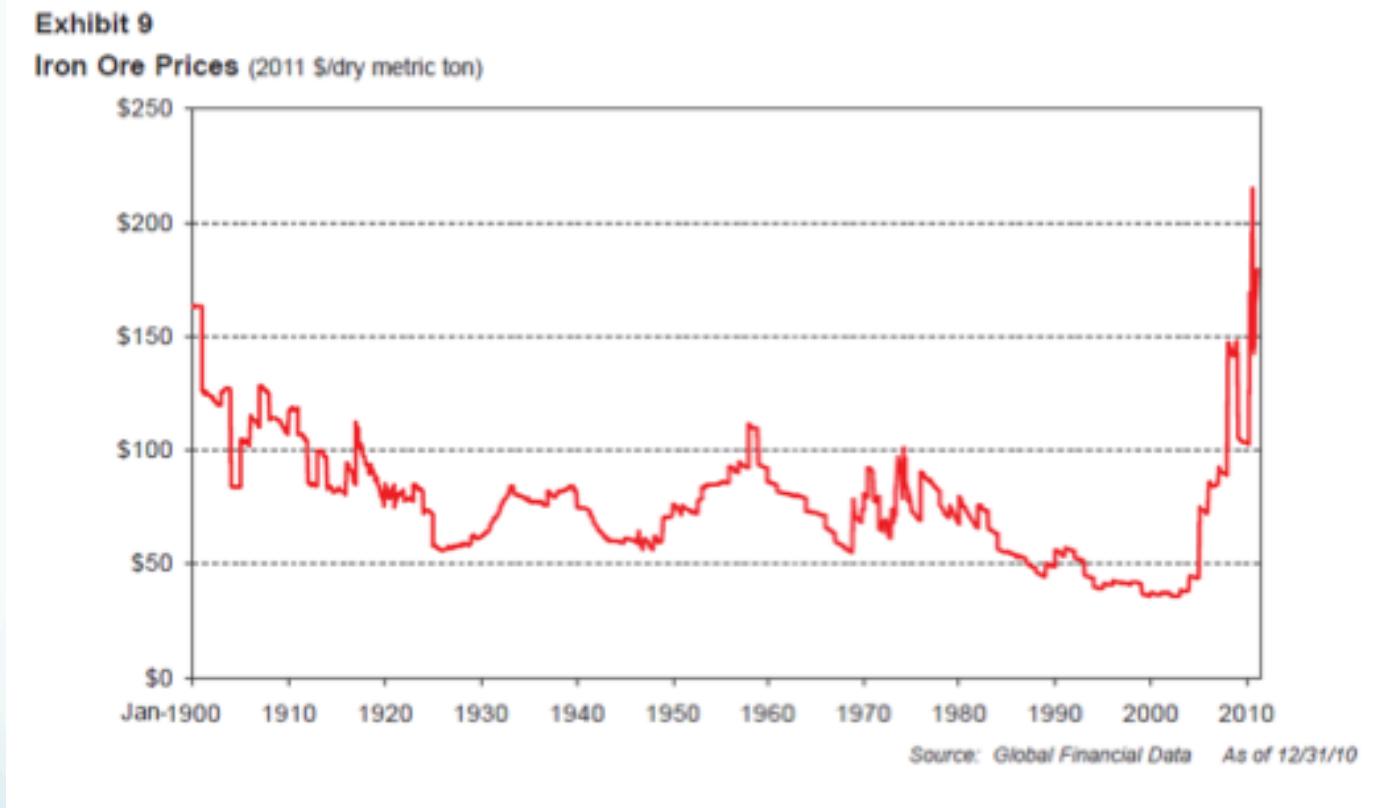
Recoverable Copper Ore Yield Grade



Source: Barclays Capital As of 12/31/10

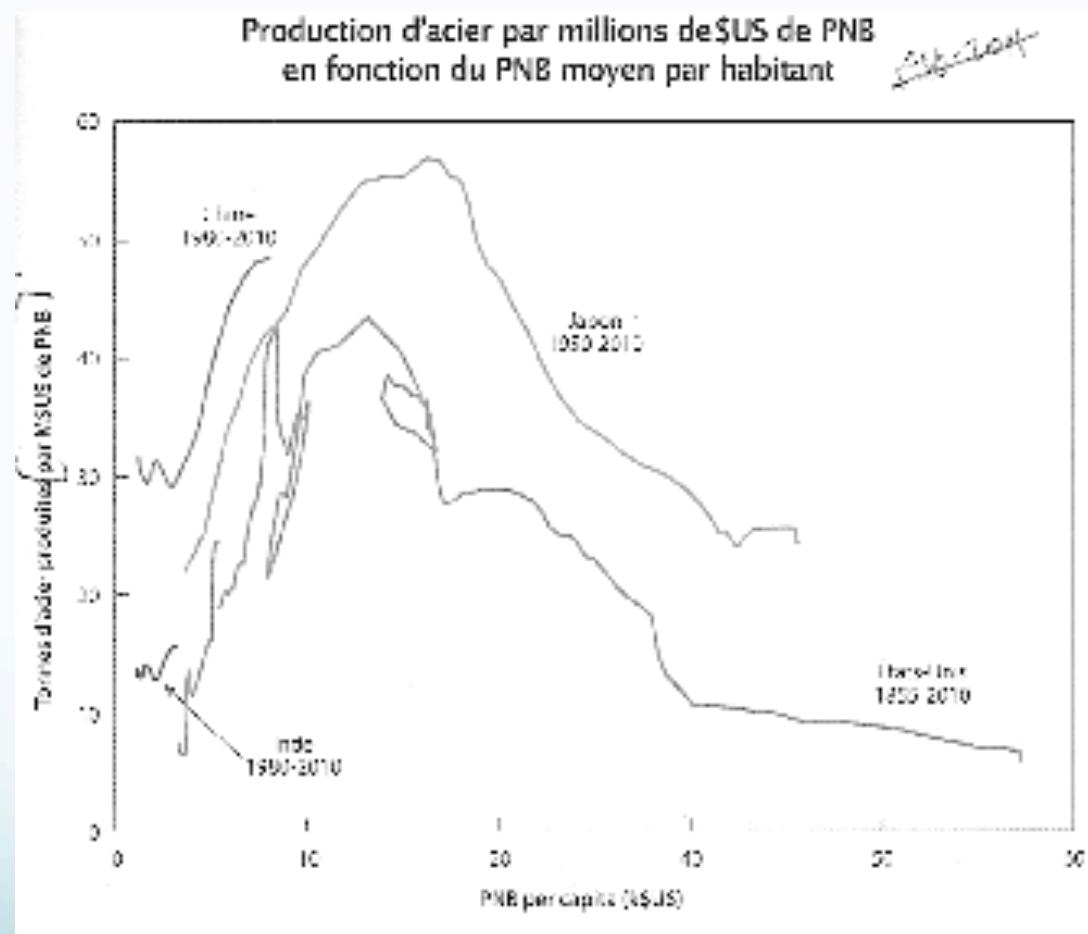
Source Grantham 2011 p.16

# FER: MARCHÉ DE LA CHINE?



Source Grantham 2011 p.17

# DÉVELOPPEMENT TRADITIONNEL



Source: Mousseau, *Le défi des ressources minières*, MultiMondes, 2012, tiré de Ellis Connolly and David Orsmond, *The Mining Industry, From Bust to Boom*, Reserve Bank of Australia, 2011

# **PIB PER CAPITA DE LA CHINE, DE 1,500,000 PERSONNES**

- PIB - per capita (PPP): \$8,500 (2011 est.)  
\$7,800 (2010 est.)  
\$7,100 (2009 est.)  
2011 dollars US
- POUR SUIVRE LA COURBE DU PASSÉ, IL FAUT DOUBLER L'ACTIVITÉ ÉCONOMIQUE POUR UN MILLIARD ET DEMI DE PERSONNES

# LA CHINE COMME MARCHÉ

Exhibit 3

China's Share of World Commodity Consumption

Commodity	China % of World
Cement	53.2%
Iron Ore	47.7%
Coal	46.9%
Pigs	46.4%
Steel	45.4%
Lead	44.6%
Zinc	41.3%
Aluminum	40.6%
Copper	38.9%
Eggs	37.2%
Nickel	36.3%
Rice	28.1%
Soybeans	24.6%
Wheat	16.6%
Chickens	15.6%
PPP GDP	13.6%
Oil	10.3%
Cattle	9.5%
GDP	9.4%

Source: Barclays Capital (2010), Credit Suisse (2010), Goldman Sachs, United States Geological Survey (2009), BP Statistical Review of World Energy (2009), Food and Agriculture Organization of the United Nations (2008), International Monetary Fund (2010)

Source Grantham 2011, p.8

**Exhibit 4**  
**The Mother of All Paradigm Shifts**

	<b>z-score*</b>	<b>Probability**</b>
Iron Ore	4.9	1 in 2,200,000
Coal	4.1	1 in 48,000
Copper	3.9	1 in 17,000
Corn	3.8	1 in 14,000
Silver	3.7	1 in 9,300
Sorghum	3.5	1 in 4,300
Palladium	3.4	1 in 3,000
Rubber	3.3	1 in 2,100
Flaxseed	3.3	1 in 2,100
Palm Oil	3.2	1 in 1,500
Soybeans	3.1	1 in 1,000
Coconut Oil	3.0	1 in 740
Nickel	2.7	1 in 290
Gold	2.6	1 in 210
Oil	2.5	1 in 160
Sugar	2.5	1 in 160
Platinum	2.4	1 in 120
Lead	2.4	1 in 120
Wheat	2.4	1 in 120
Coffee	2.3	1 in 85
Diammonium Phosphate	2.1	1 in 56
Jute	2.1	1 in 56
Cotton	2.0	1 in 44
Uranium	1.9	1 in 35
Tin	1.9	1 in 35
Zinc	1.9	1 in 35
Potash	1.9	1 in 35
Wool	1.7	1 in 22
Aluminum	1.4	1 in 12
Lard	0.9	1 in 5
Pepper	0.5	1 in 3
Natural Gas	0.2	1 in 2
Plywood	-0.1	1 in 2
Beef	-0.1	1 in 2
Cocoa	-0.1	1 in 2
Tobacco	-3.3	1 in 2000

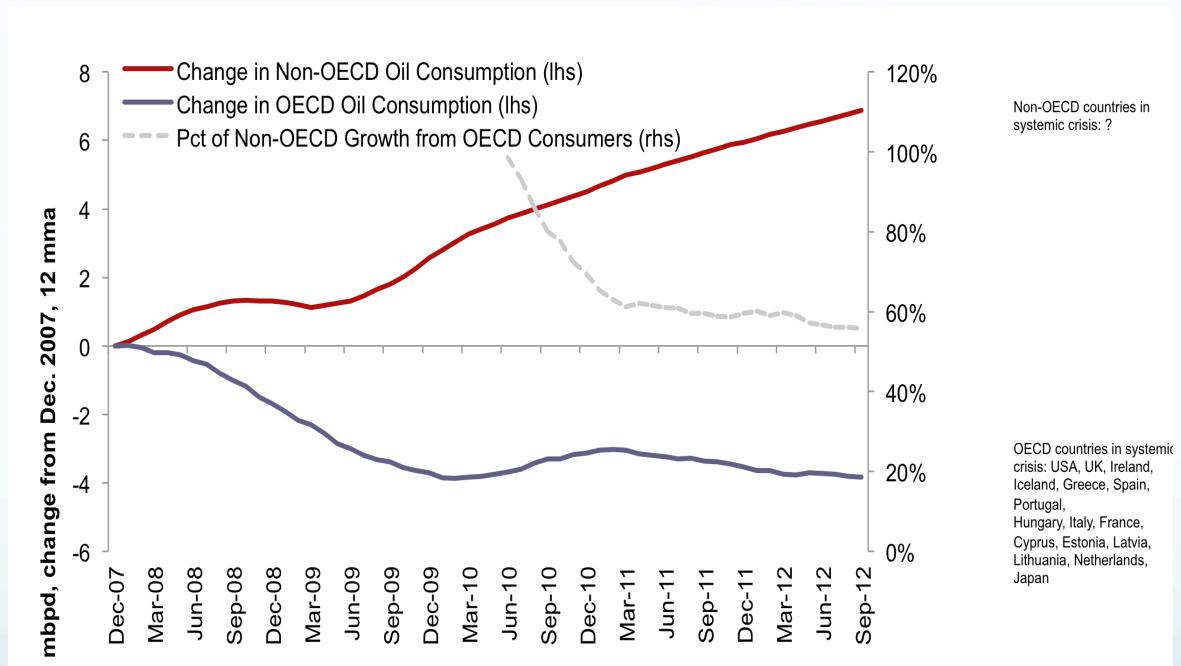
\* z-score: difference between current price and long-term trend, expressed in standard deviations

\*\* Probability: implied probability under assumption of normal distribution of valuations

Source: GMO As of 3/28/11

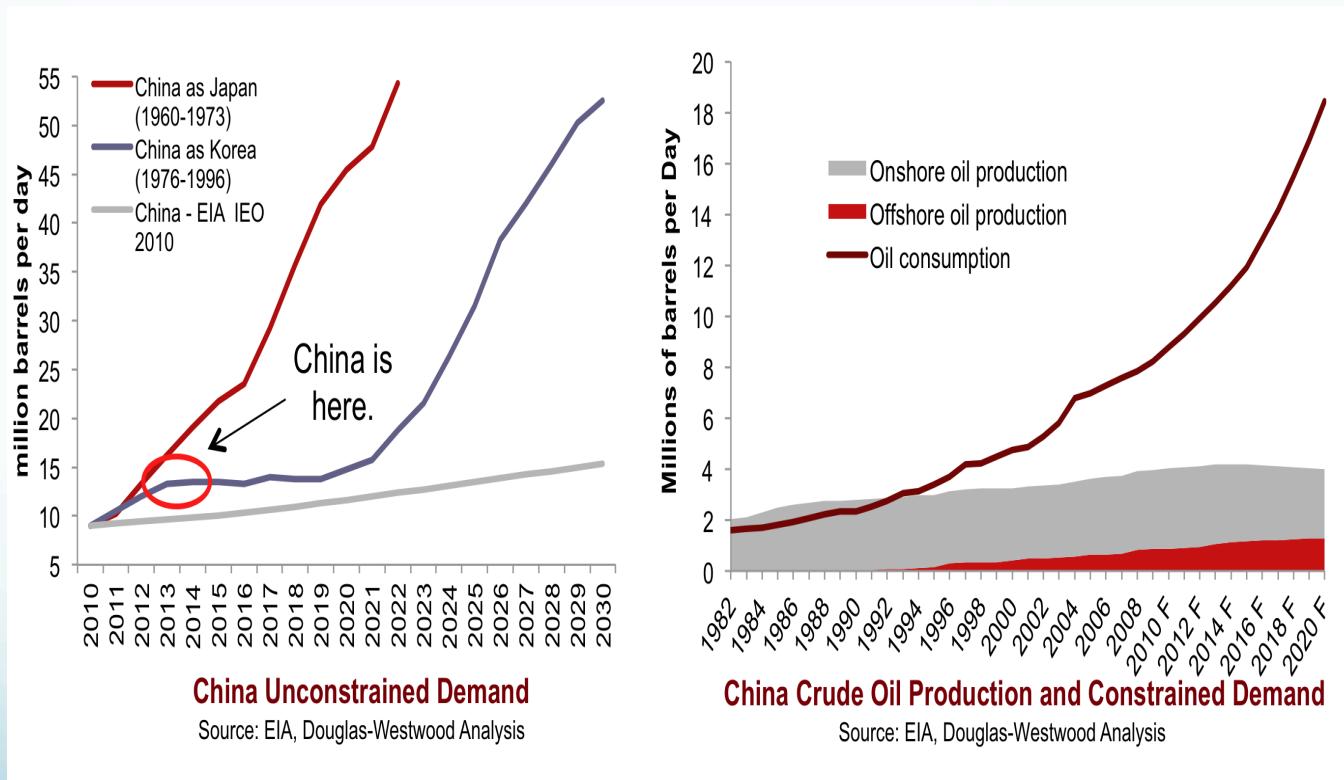
Source Grantham 2011, p.9

# PÉTROLE: CHINE ET OCDE



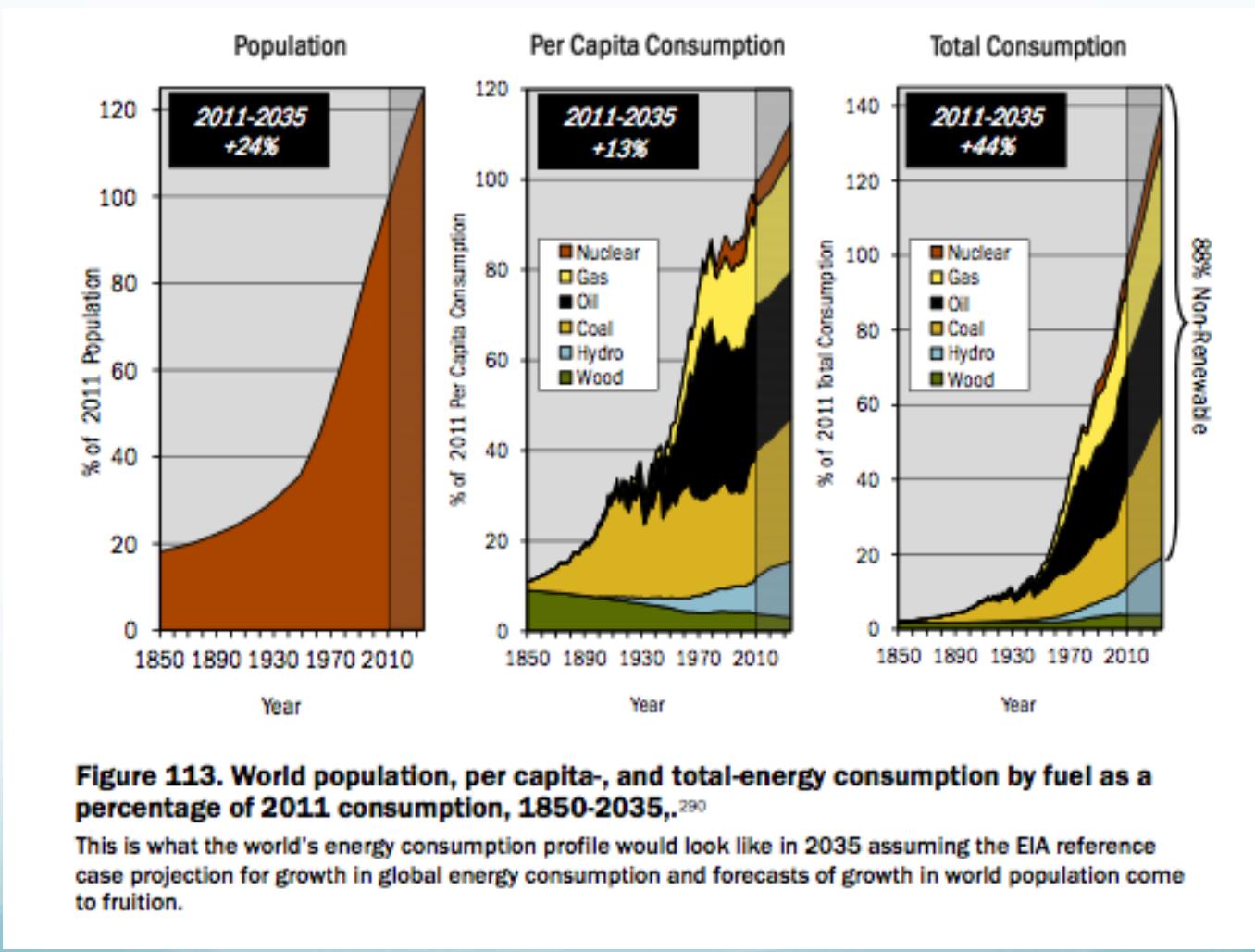
SOURCE: KOPITS, BURLINGTON OCTOBRE 2012

# LA CHINE ET LE PÉTROLE: LES CONTRAINTES



Source Kopits 2012

# CROISSANCE INSOUTENABLE

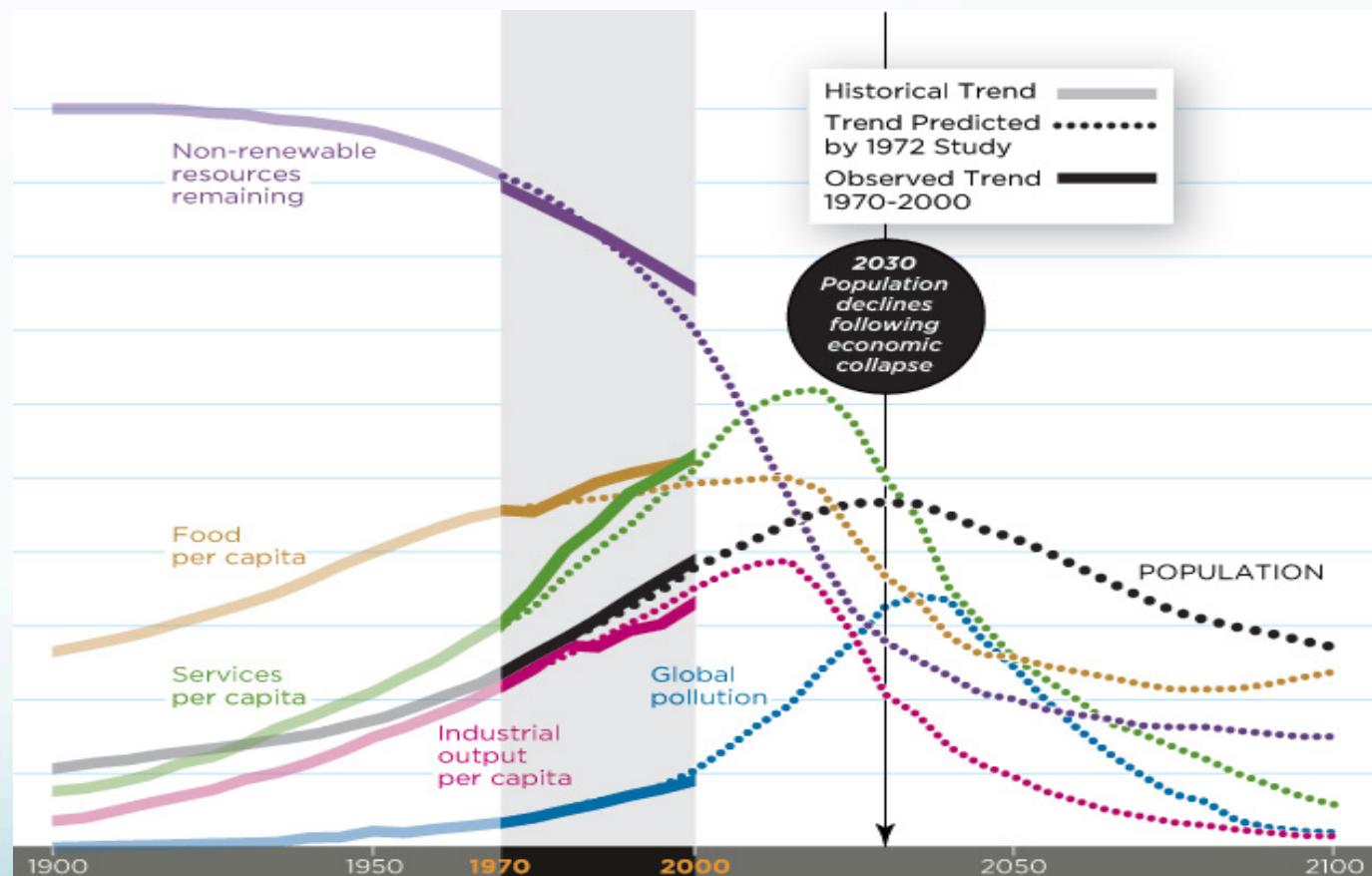


Hughes, op.cit., p.163

- Projections from the latest EIA International Energy Outlook reference case suggest that world energy consumption will grow by 44 percent from 2011 through 2035, by which time population will have grown 23 percent and per capita energy consumption will have grown 14 percent (Figure 113). The cumulative amount of energy consumption required to sustain such an increase amounts to 71 percent of all the hydrocarbons consumed between 1850 and 2011 - in just 24 years. This would get us to 10 times the average per capita energy consumption of 1850 and 70 times the total energy throughput.
- Hughes, ibid.

# HALTE À LA CROISSANCE!

## 1970-2010



Graham Turner <http://www.smithsonianmag.com/science-nature/Looking-Back-on-the-Limits-of-Growth.html#ixzz1t4wdwc7g> et, plus généralement <http://www.csiro.au/files/files/plje.pdf>

- The data review continues to confirm that the standard run scenario represents real-world outcomes considerably well. This scenario results in collapse of the global economy and population in the near future. It begins in about 2015 with industrial output per capita falling precipitously, followed by food and services. Consequently, death rates increase from about 2020 and population falls from about 2030 – as death rates overtake birth rates.
- Graham M. Turner, On the Cusp of Global Collapse?, Gaia, 2012, p.123 -  
<http://xa.yimg.com/kq/groups/18821650/435212220/name/GAIA2%202012%20116%20124%20Turner.pdf.pdf>

- The collapse in the *standard run* is primarily caused by resource depletion and the model response of diverting capital away from other sectors in order to secure less accessible resources. Evidence for this mechanism operating in the real world is provided by comparison with data on the energy required to secure oil. Indeed, the EROI has decreased substantially in recent decades, and is quantitatively consistent with the relevant parameter in the *World3* model. The confirmation of the key model mechanism underlying the dynamics of the *standard run* strengthens the veracity of the *standard run* scenario. The issue of peak oil has also affected food supply and evidently played a role in the current global financial crisis. While the GFC does not directly reflect collapse in the *LtG standard run*, it may well be indirectly related.
- Ibid.

# HAUSSE PRIX DU PÉTROLE ET RÉCESSIONS 1970-2007

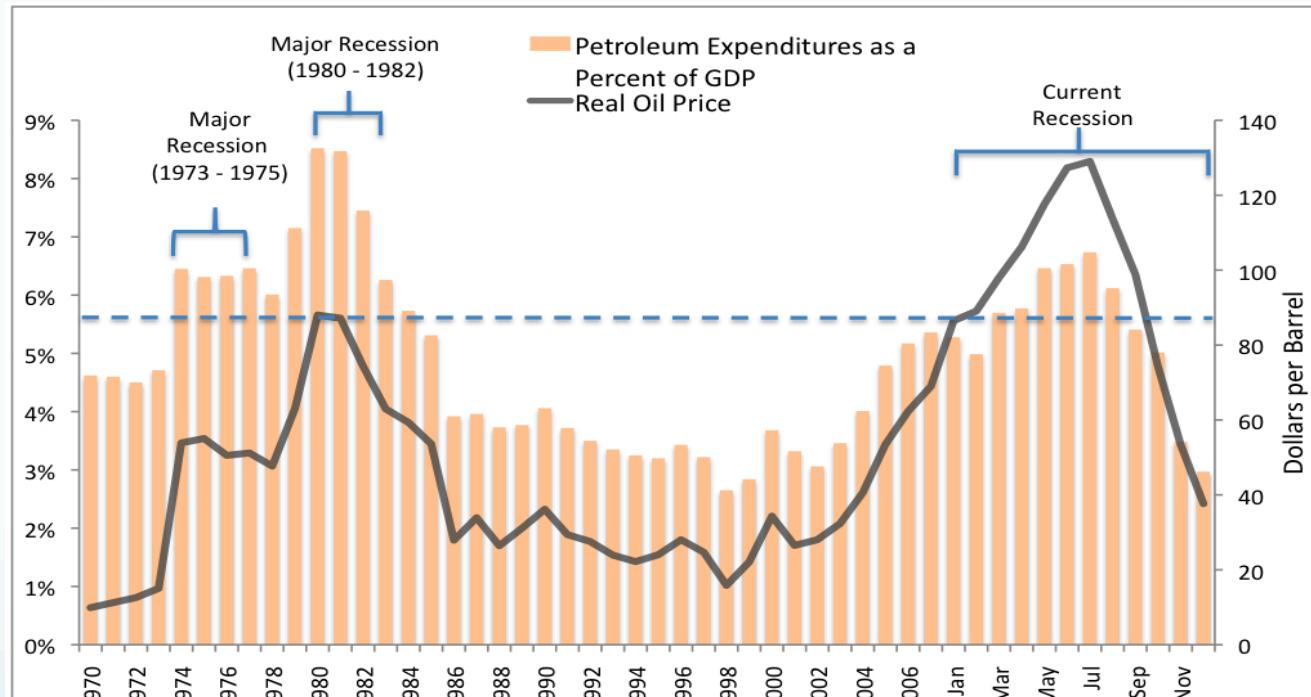
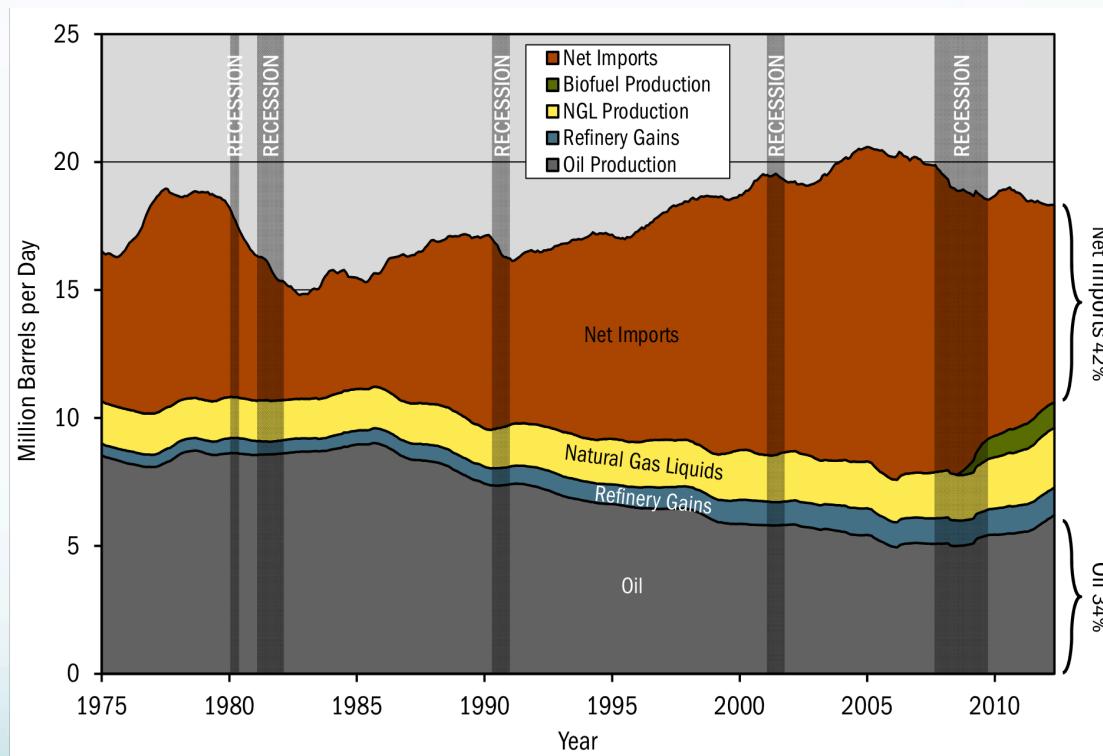


Figure 1. Petroleum expenditures as a percent of GDP in the U.S. and real oil price.

Hall et al, 2012, op.cit

# CONSOMMATION PÉTROLE ET RÉCESSIONS 1975-2012



Hughes, Op. cit., p.13

# TURNER: HALTE!

- The corroboration here of the *LtG standard run* implies that the scientific and public attention given to climate change, whilst important, is out of proportion with, and even deleteriously distracting from the issue of resource constraints, particularly oil. Indeed, if global collapse occurs as in this *LtG scenario*, then pollution impacts will naturally be resolved, though not in any ideal sense.

Ibid.

**Harvey L. Mead**  
avec la collaboration de Thomas Marin

# L'indice de progrès véritable du Québec

**QUAND L'ÉCONOMIE DÉPASSE L'ÉCOLOGIE**

