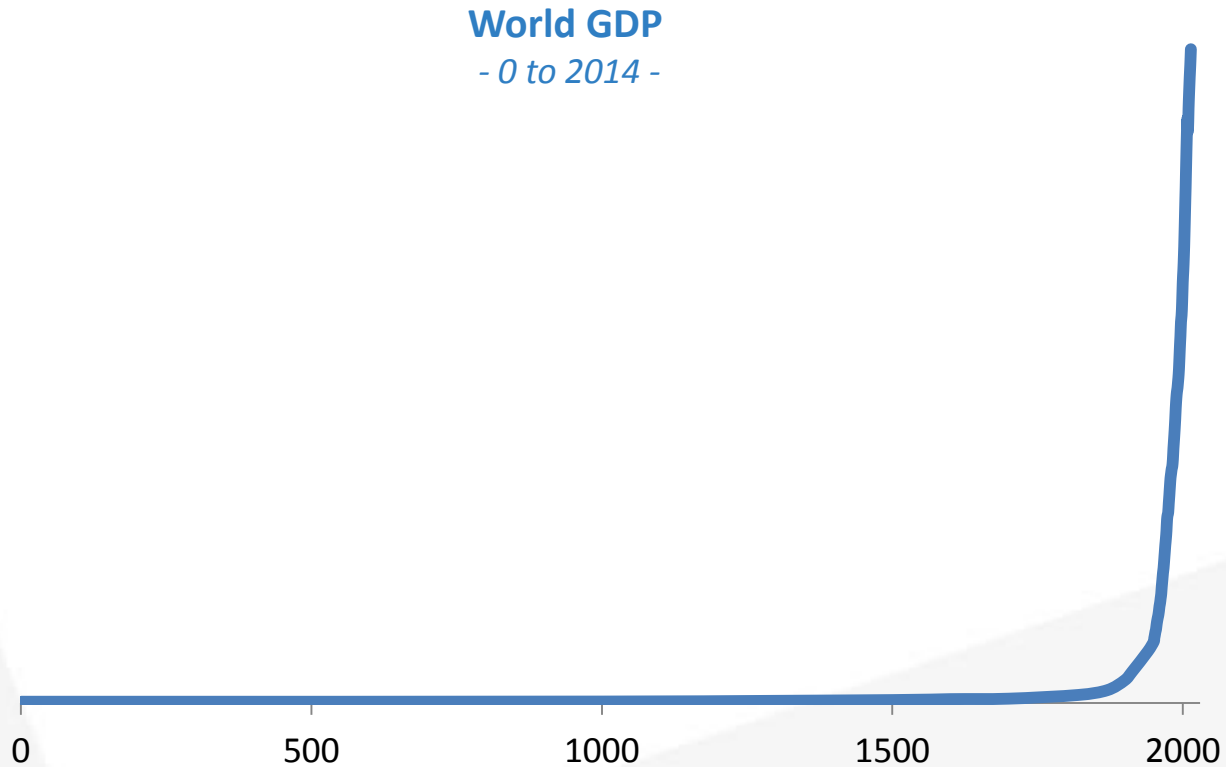


The end of growth?



Nicolas Meilhan

Member of les [Econoclastes](#) and of [ASPO France](#)



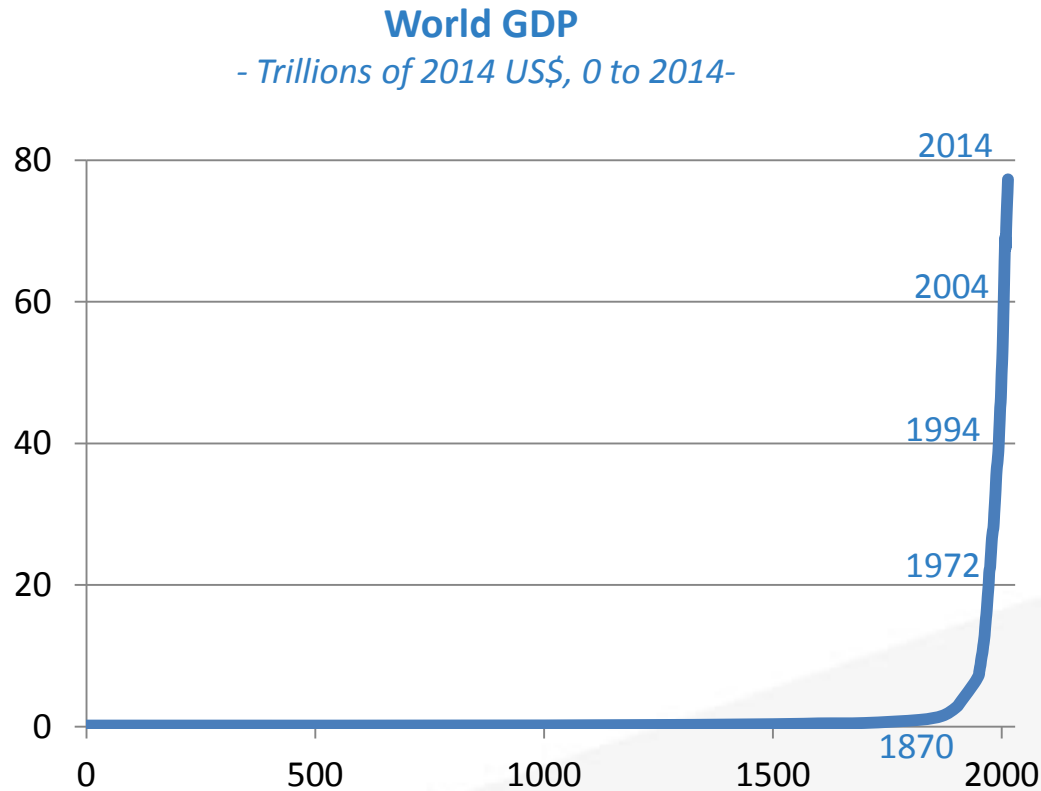
Les Éconoclastes

THINK TANK

Géopolitique
Macroéconomie
Marchés financiers

“Anyone who believes exponential growth can go on forever in a finite world is either a madman or an economist”

Kenneth Boulding



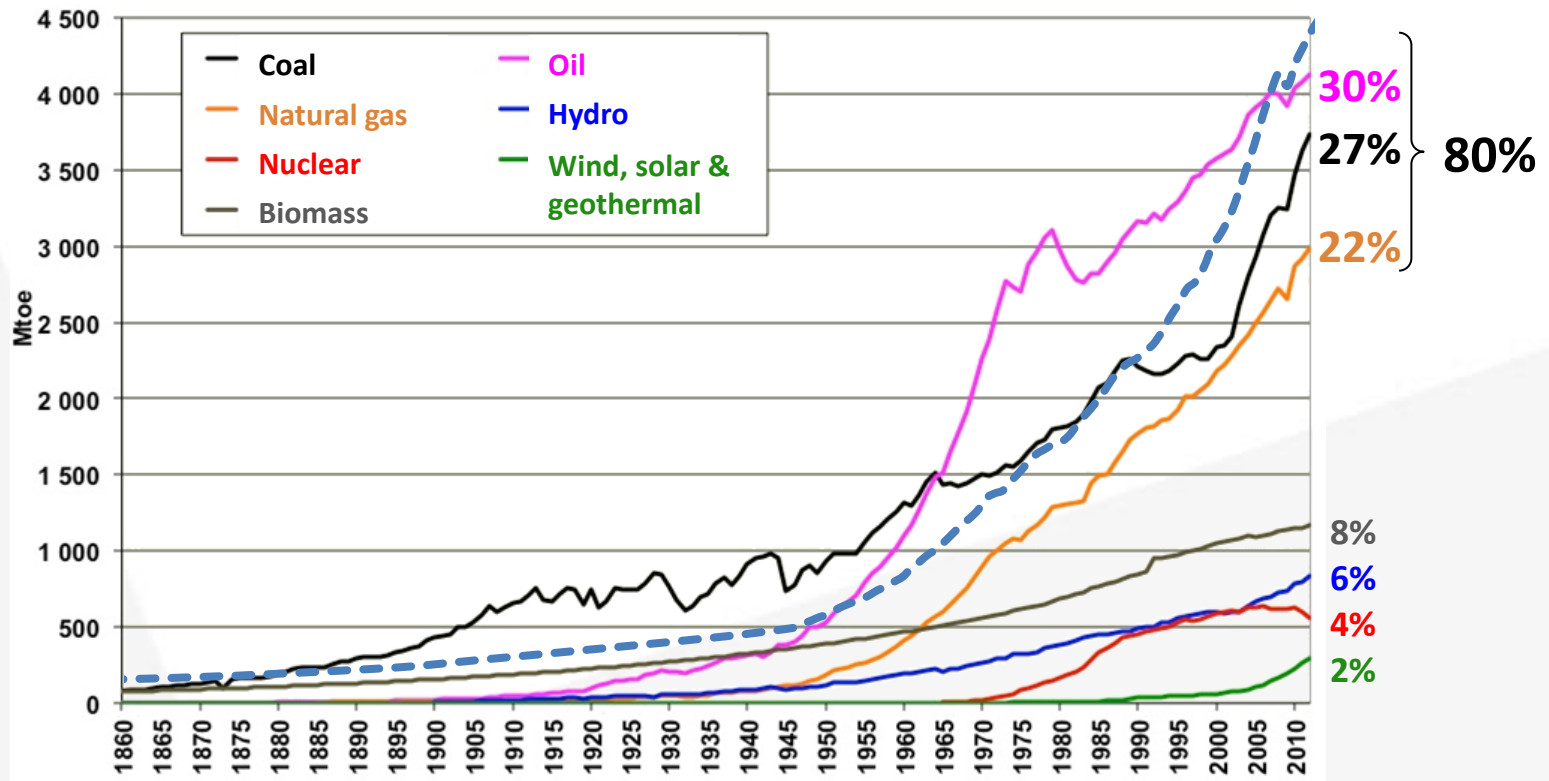
Source: Angus Maddison

Oil is by far the main source of energy (and economic growth)



Evolution of world primary energy consumption

- Million tons of oil equivalent , 1860 to 2012 -

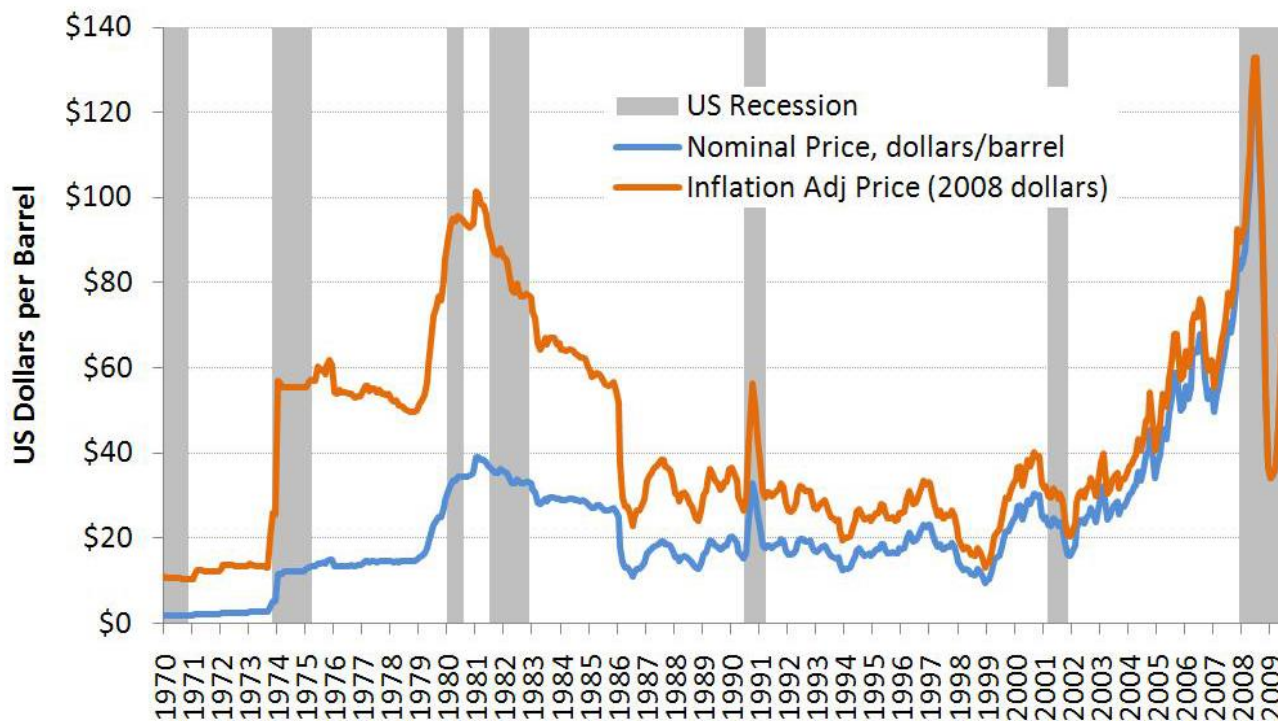


Sources: Shilling et al., 1977, et BP Statistical Review, 2013



Four of the last five global recessions were preceded by an oil shock

Economic Recession vs. Oil Price

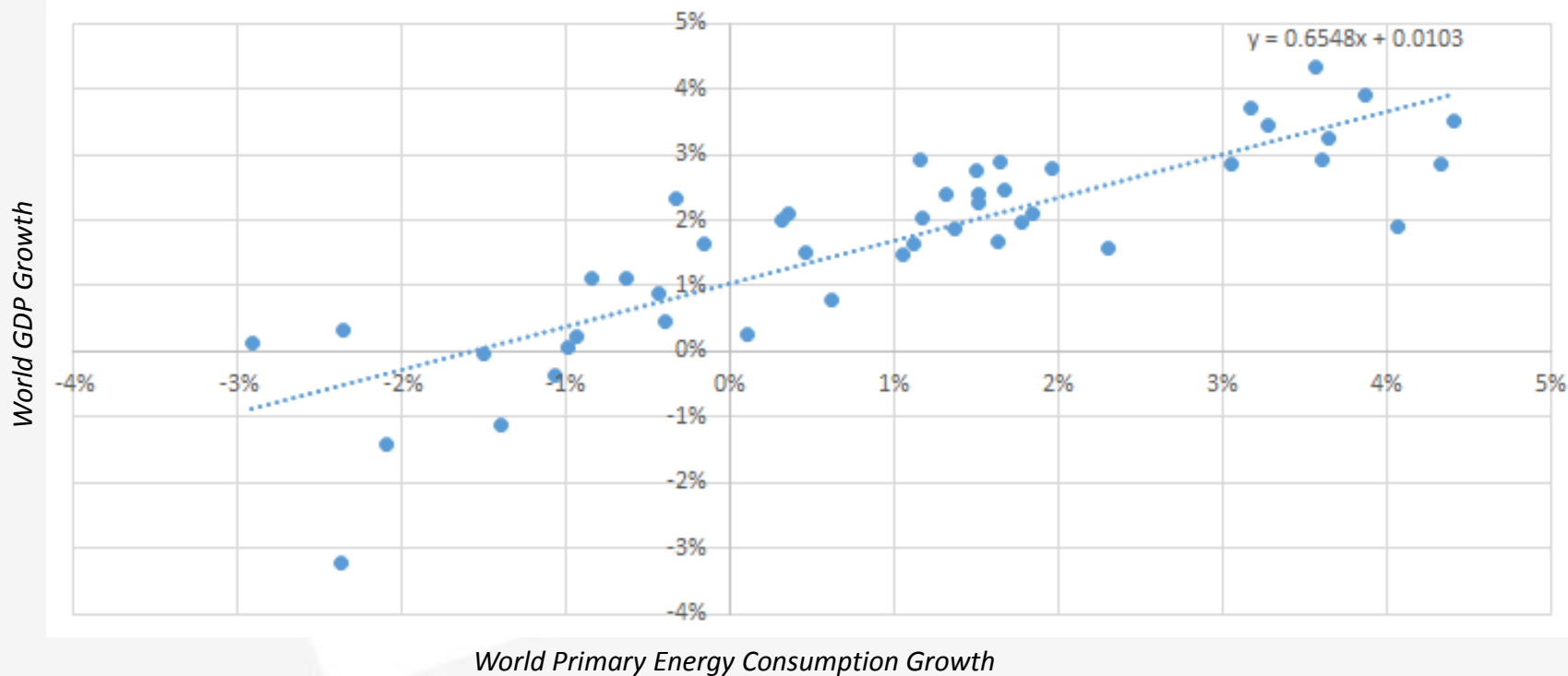


Source: Steven Kopits, June 2009, Douglas Westwood, Oil: What price can America afford?, EIA, NBER



Can we still grow our economy without energy?

**Comparison of the world GDP growth
with the world Primary Energy consumption growth**
- 50 countries, 1970 to 2011-



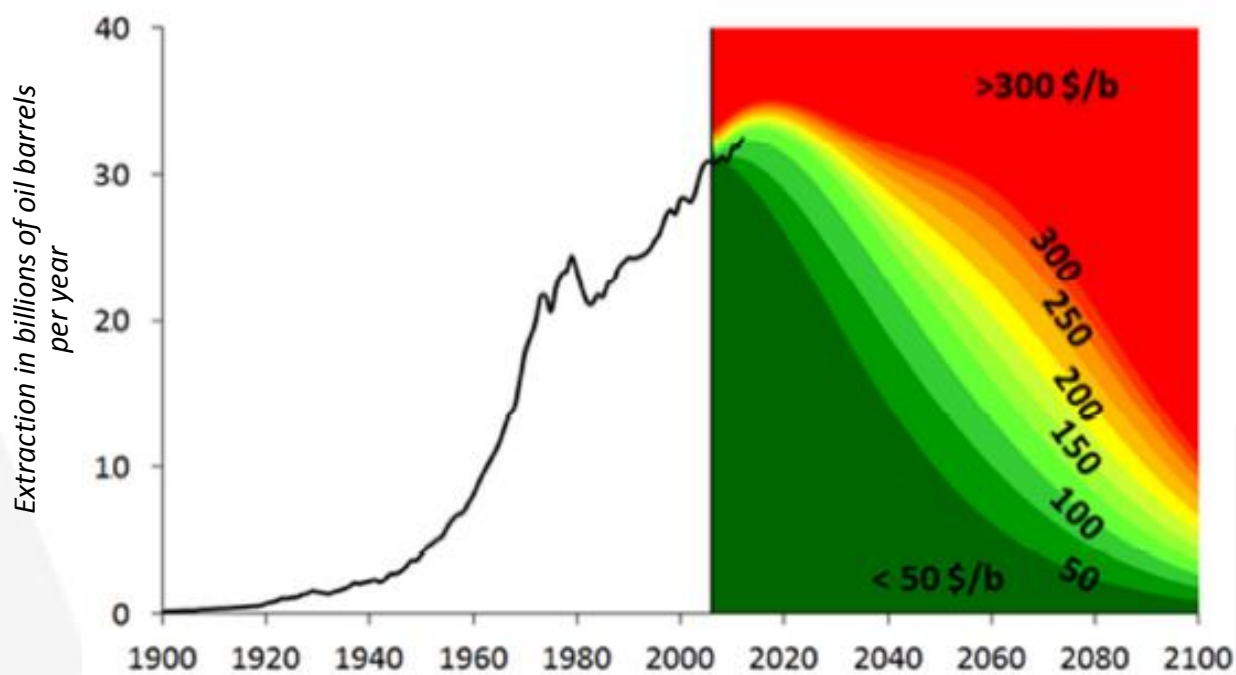
Source: [How Dependent is Growth from Primary Energy ? Output Energy Elasticity in 50 Countries \(1970-2011\)](#), Gaël Giraud et Zeynep Kahraman, 2014



How much oil (and growth) is left to fuel our economy?

All liquid fuels extraction

- 1900 to 2100 -

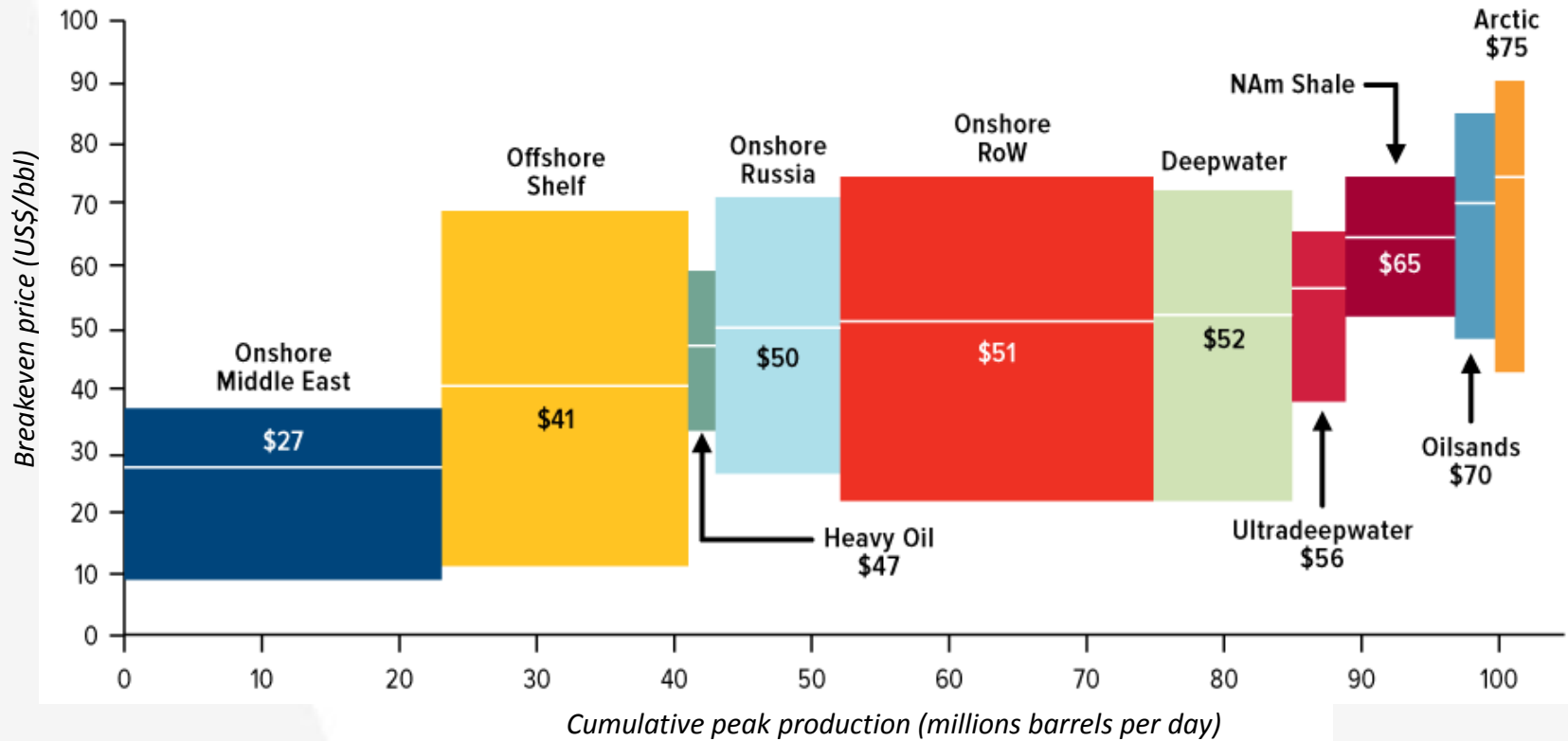


Source : Patrick Brocorens, ASPO Belgique

We still have a lot of oil left in the ground, but it is getting more and more expensive to extract it ...



Breakeven prices for non-producing oil fields



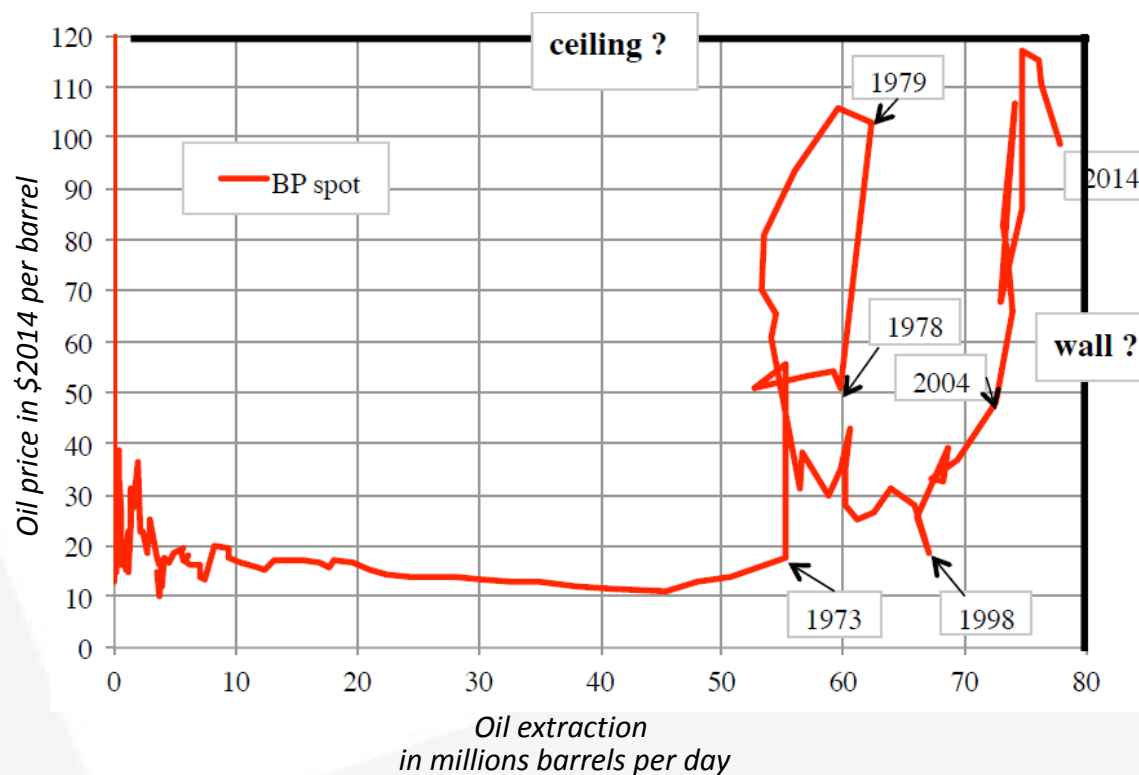
Source: Rystad Energy, Morgan Stanley, U.S. Global Investors

...while our willingness to pay for it is likely to decline,
which will engender an oil extraction and consumption peak



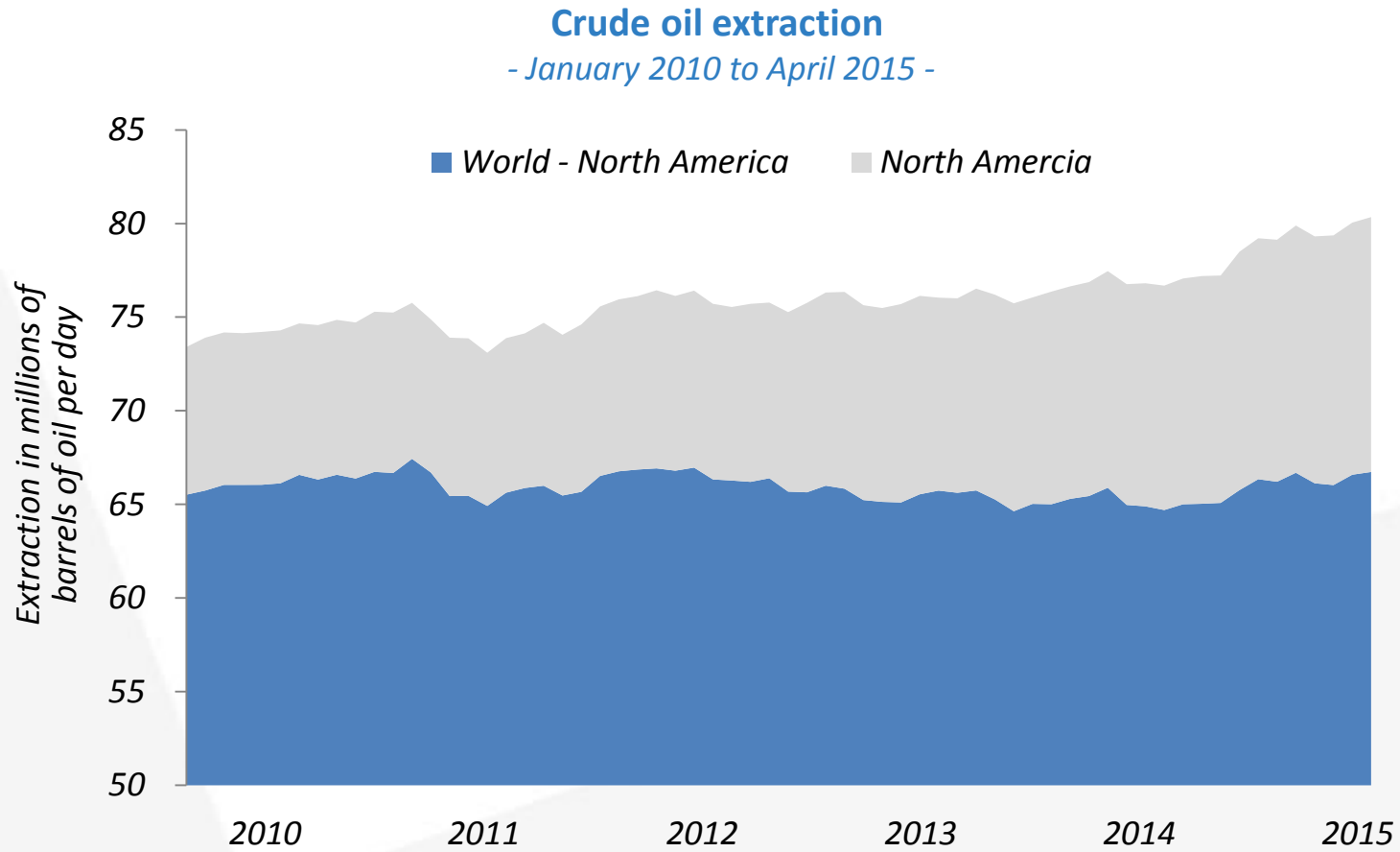
Oil price vs. Crude oil extraction

- 1961 à 2014 -



Source : Jean Laherrere, ASPO France, EIA

Peak “all oil” is already a reality since January 2011, excluding North-America non-conventional oil production...



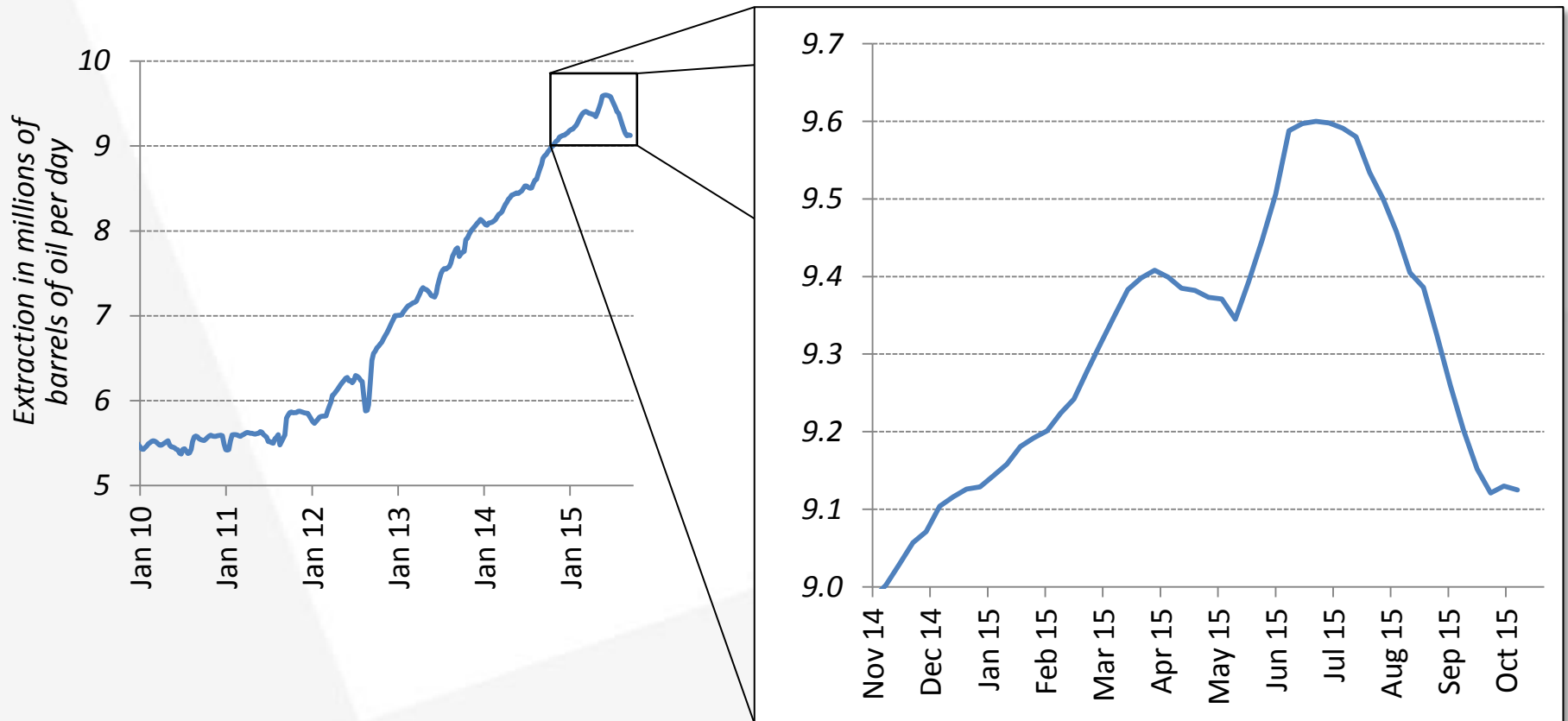
Source : EIA

... which might peak as soon as 2015

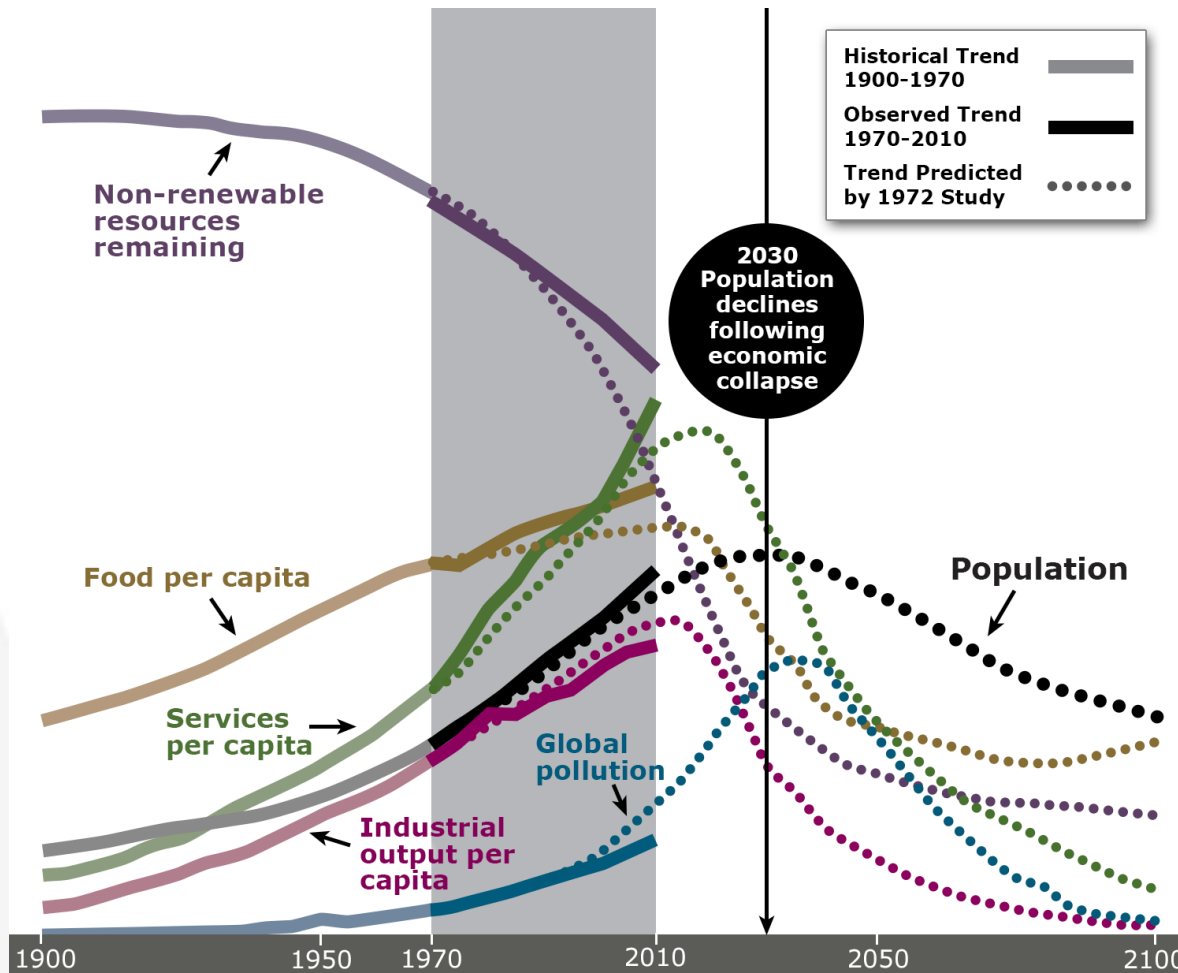


US crude oil extraction

- Millions barrels per day, January 2010 to September 2015 -



And peak « all oil » most likely means the growth party is over...



Source : Graham M. Turner 2012 – « [On the Cust of Global Collapse? Updated Comparison of the Limits to Growth with Historical Data](#) »
GAIA - Ecological Perspectives for Science and Society, Volume 21, Number 2, June 2012, pp.116-124




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