

Unconventionals in today's energy landscape

Shale Gas Fracking – Should We Really Be Concerned?

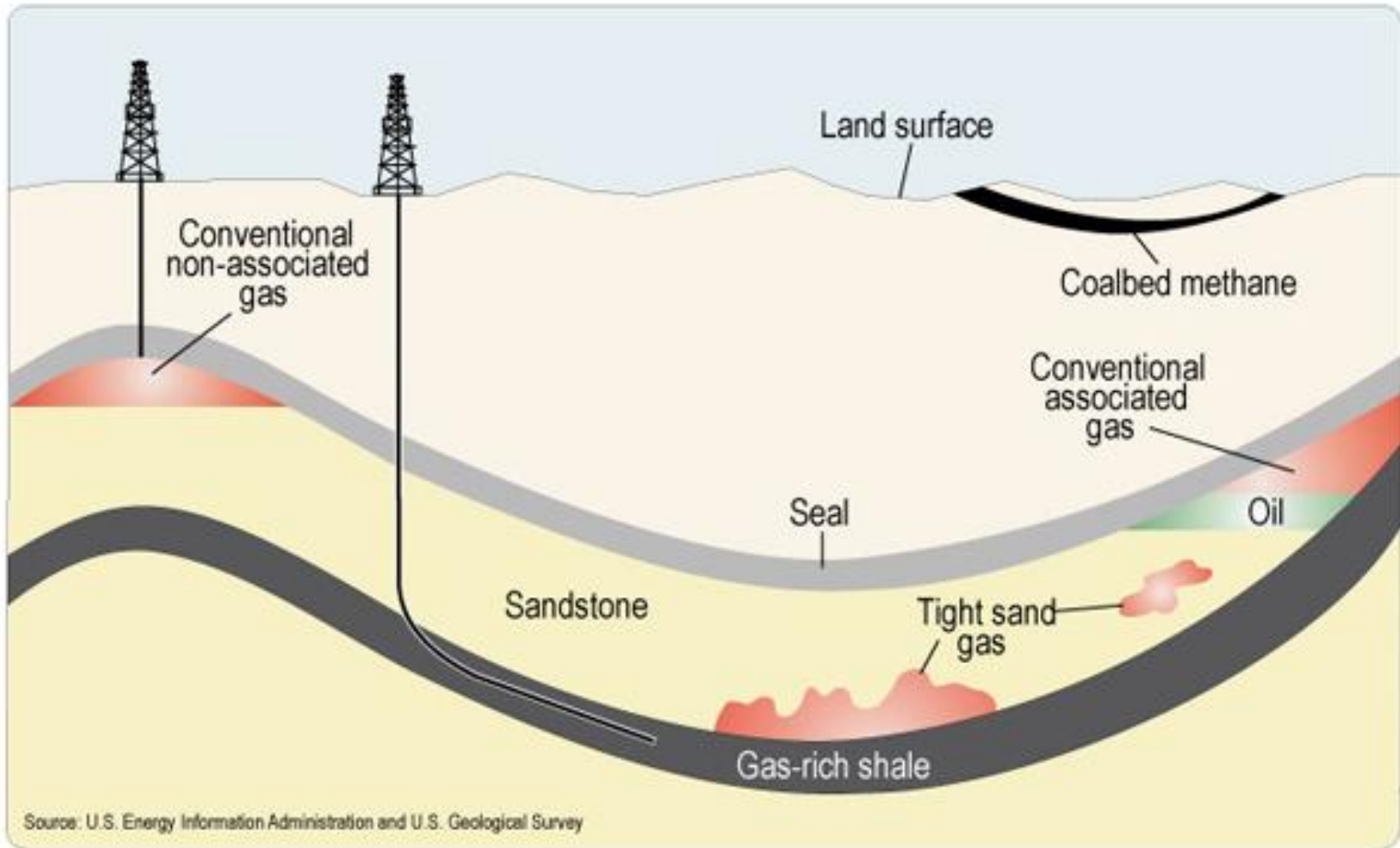
London, October 17th 2013

Professor David Elmes,

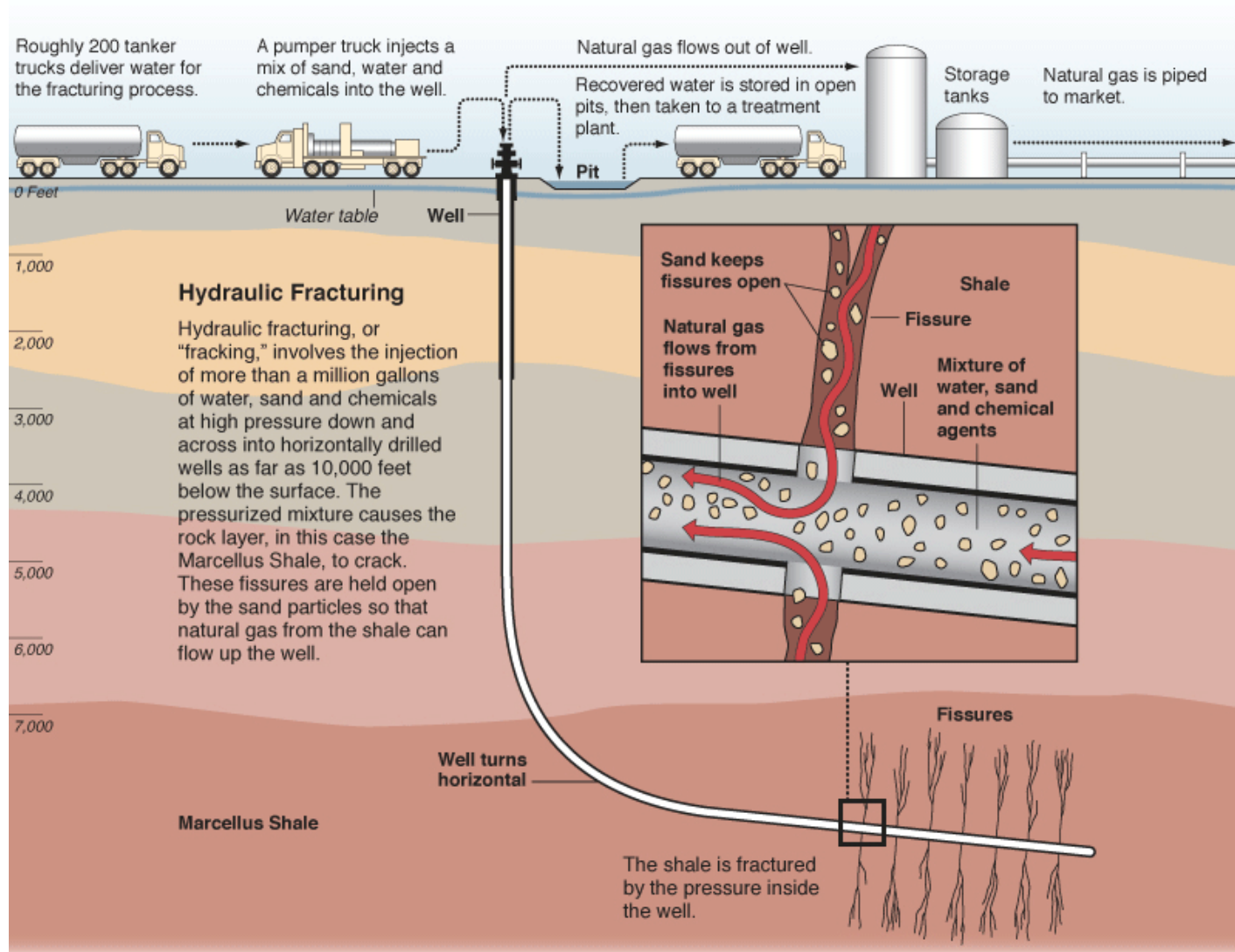
Warwick Business School

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Sources of unconventional gas



The hydraulic fracturing process

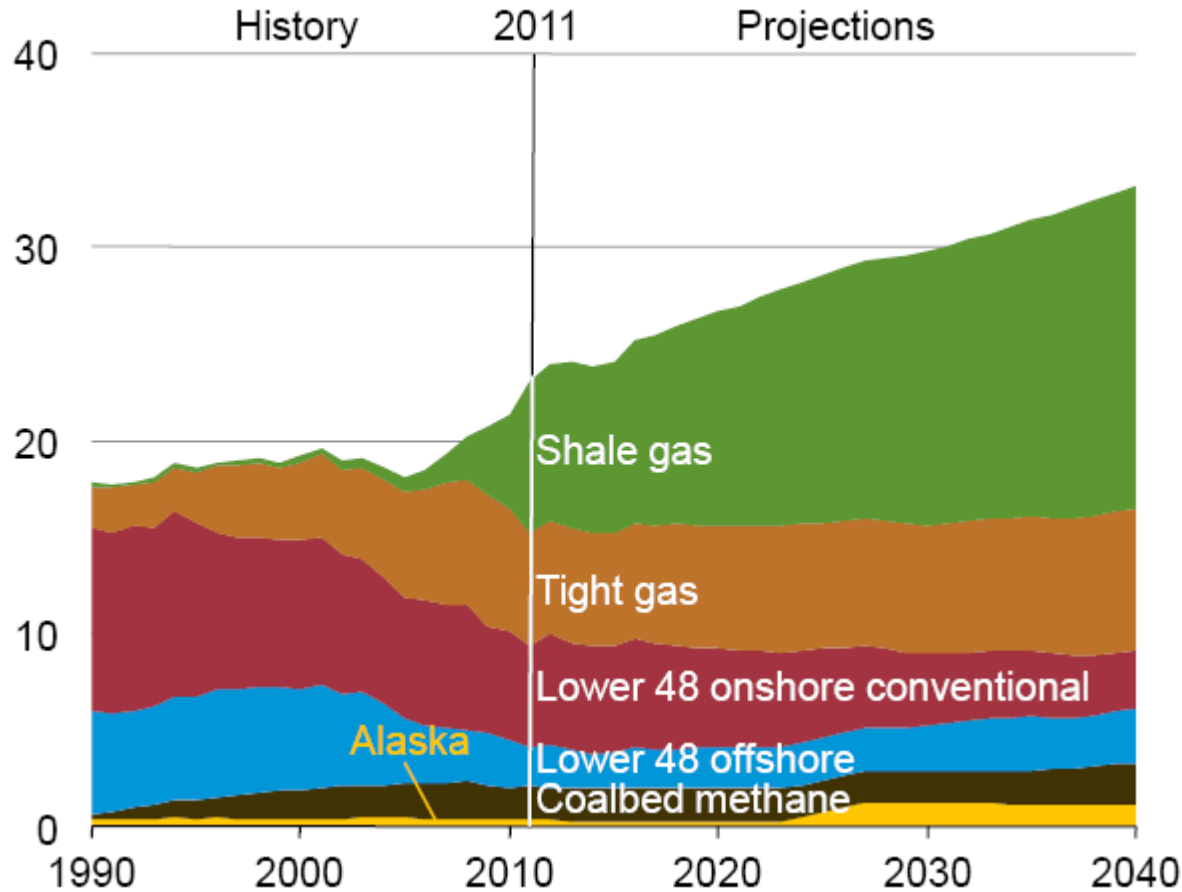


<http://www.propublica.org/special/hydraulic-fracturing-national>

Graphic by Al Granberg

The dramatic rise in US shale gas

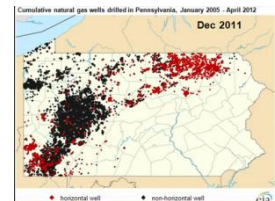
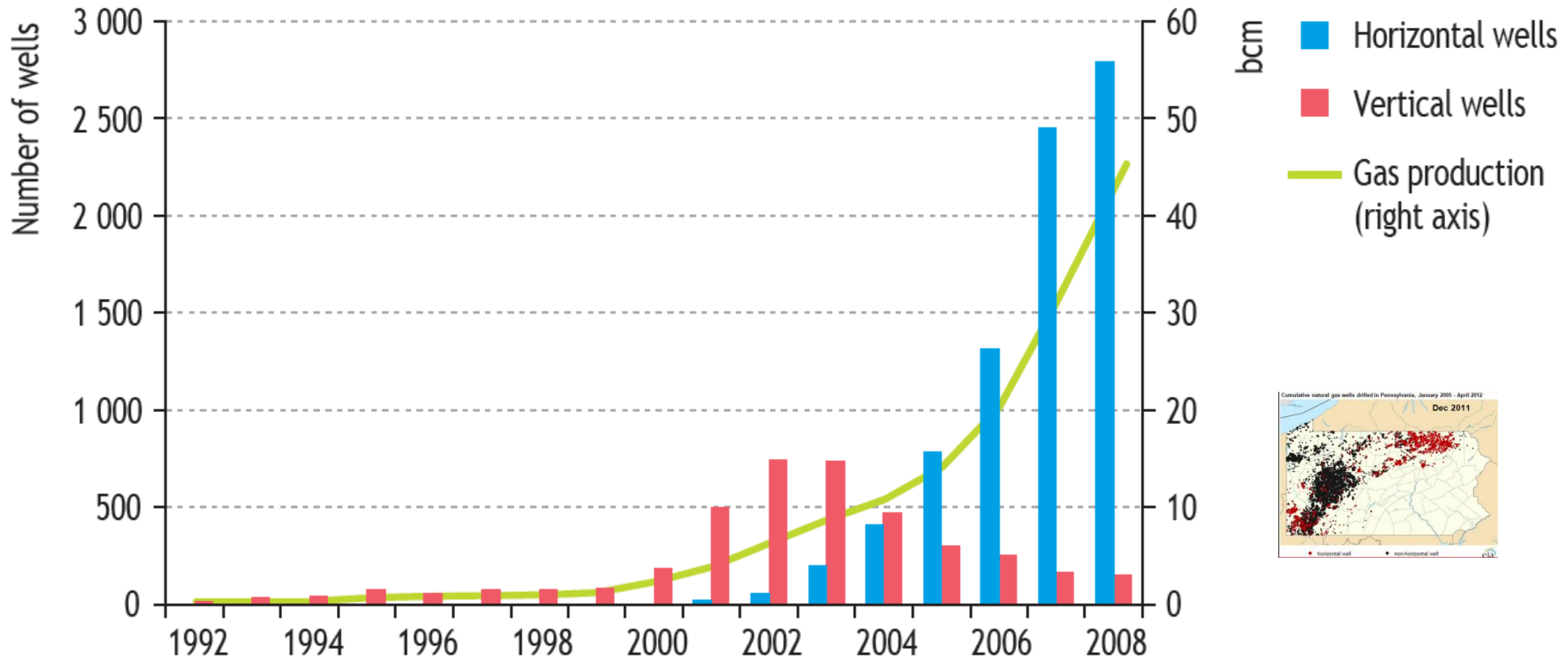
US Natural gas production by source, 1990-2040 (trillion cubic feet)



EIA (2013) AEO2013

It's taken a long time to make unconventional gas economic...

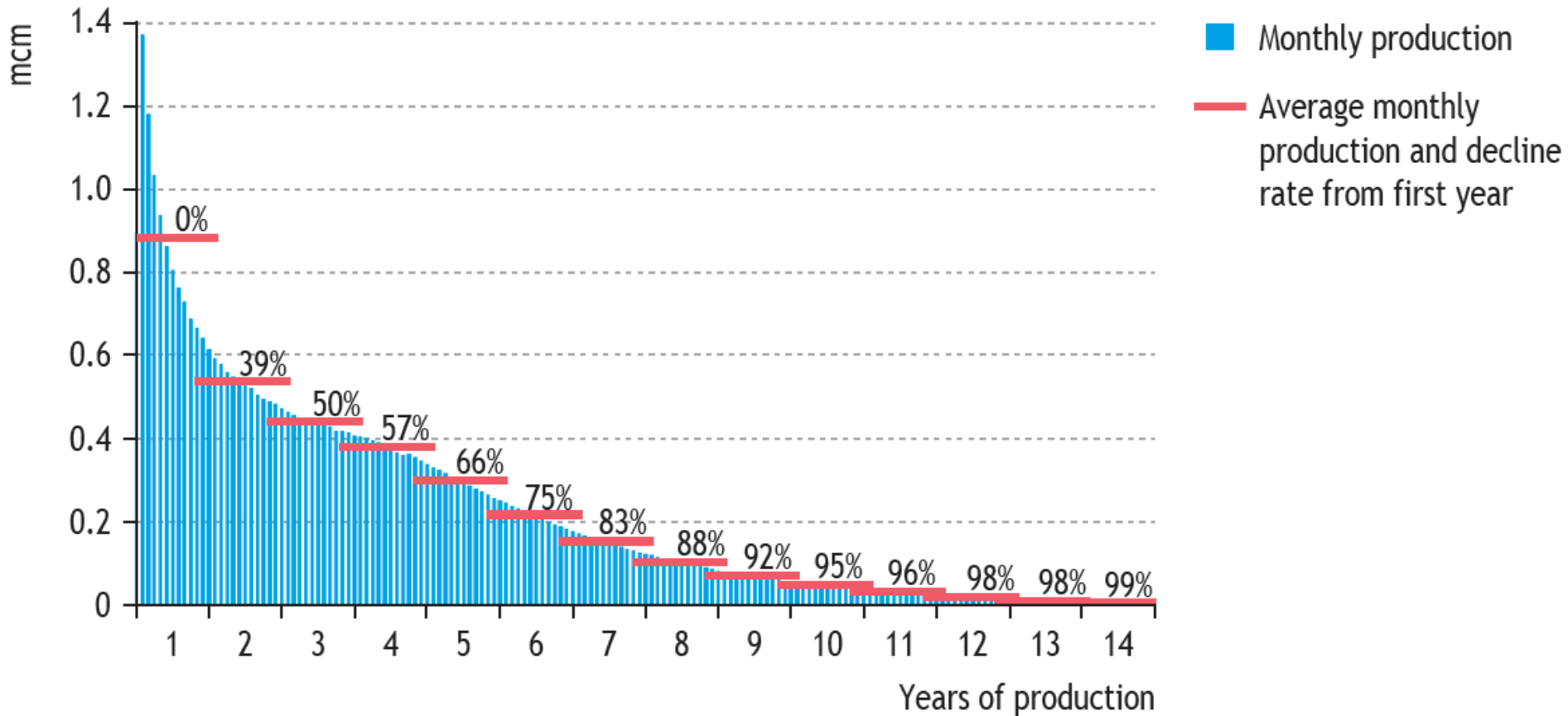
Barnett Shale gas wells completed and resulting gas production



OECD/IEA (2009) WEO Fig 11.7

...and requires continual drilling and fracking

Production decline rates for Barnett shale gas horizontal wells



IEA (2009) WEO

Why the rapid growth in the US?

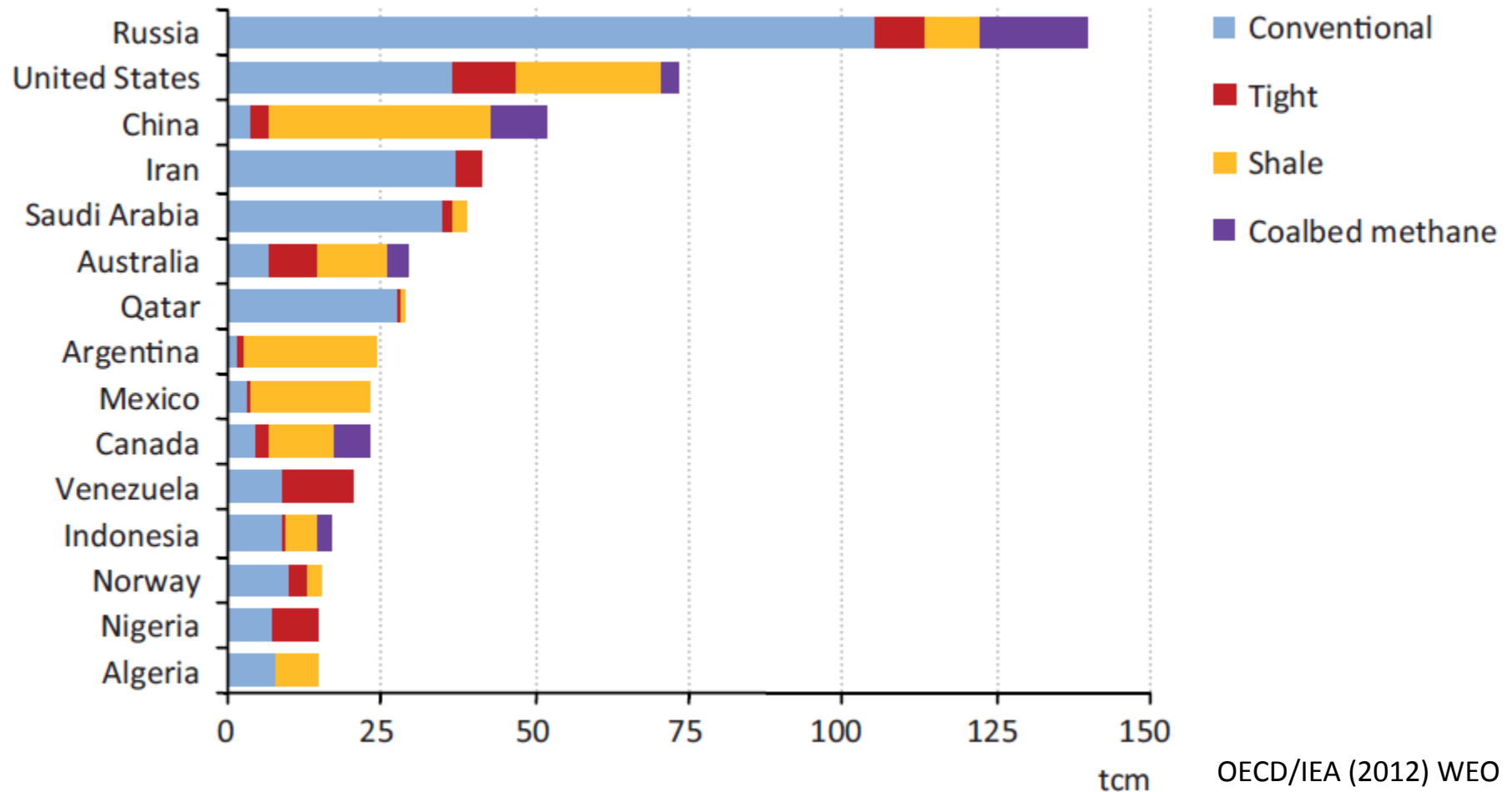
- ⊙ Affordable drilling & hydraulic fracturing
- ⊙ Property rights
- ⊙ Pipeline network & access regulations
- ⊙ Existing onshore drilling industry
- ⊙ Tax credits in the early days
- ⊙ Outside environmental regulations in the early days

Stevens (2010)

http://www.chathamhouse.org/sites/default/files/public/Research/Energy,%20Environment%20and%20Development/r_0910stevens.pdf

Unconventional gas as a game-changer in global supplies

Remaining recoverable gas resources in the top fifteen countries, end-2011

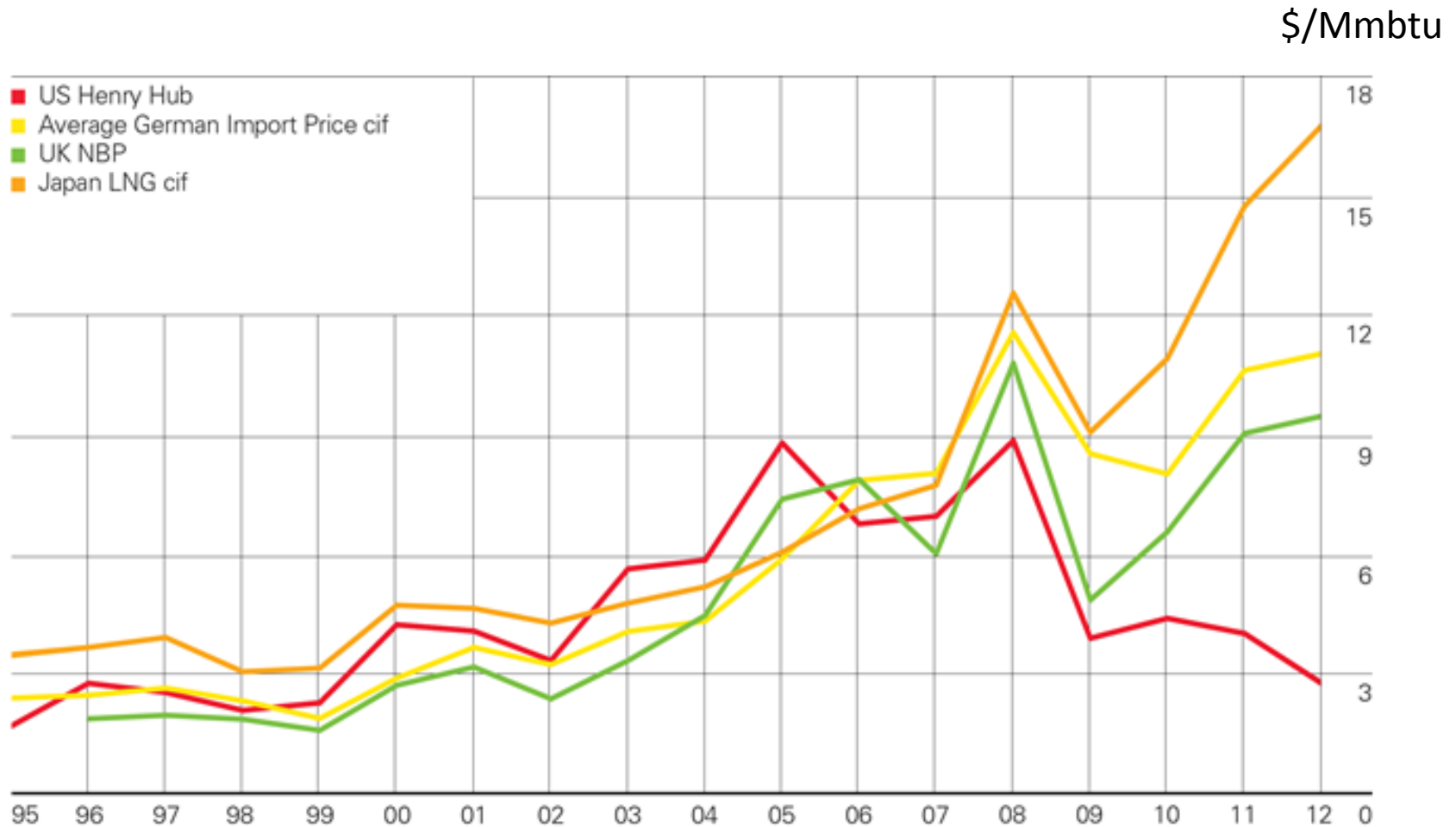


OECD/IEA (2012) WEO

Current Situation – the good news

- ◎ Shale gas has jumped from 1% to 34% of US gas production between 2000 to 2011
- ◎ Low prices seen as underpinning US economic recovery and international competitiveness
 - FT Editorial, 7th December 2012
 - “The shale gas revolution, too, promises a stronger US growth. Greater hydrocarbon self-sufficiency and lower prices will make investing more attractive. This is one reason why manufacturing, which was long leaving America for lower-cost locations, is coming back. And not just oil and gas-intensive sectors such as petrochemicals. In a symbolically significant move, [Apple](#) is bringing some production of Mac computers back to the US.”

Regional gas prices – the effect of shale gas in the US



BP Statistical Review of World Energy (2013)

Current Situation – the bad news

- ◎ Collapse in US gas prices:
 - Decline from 2008 peak of \$12/Mbtu to as low as \$2, now back at \$3-4
- ◎ Widespread industry concern about profitability
 - Shift to liquids production
- ◎ Companies forced to write down booked reserves
 - \$3.3Bn by Chesapeake Energy in November 2012

Gas impairment charges*
Selected companies, Q2 2012 (\$bn)



Sources: companies; Thomson Reuters Datastream

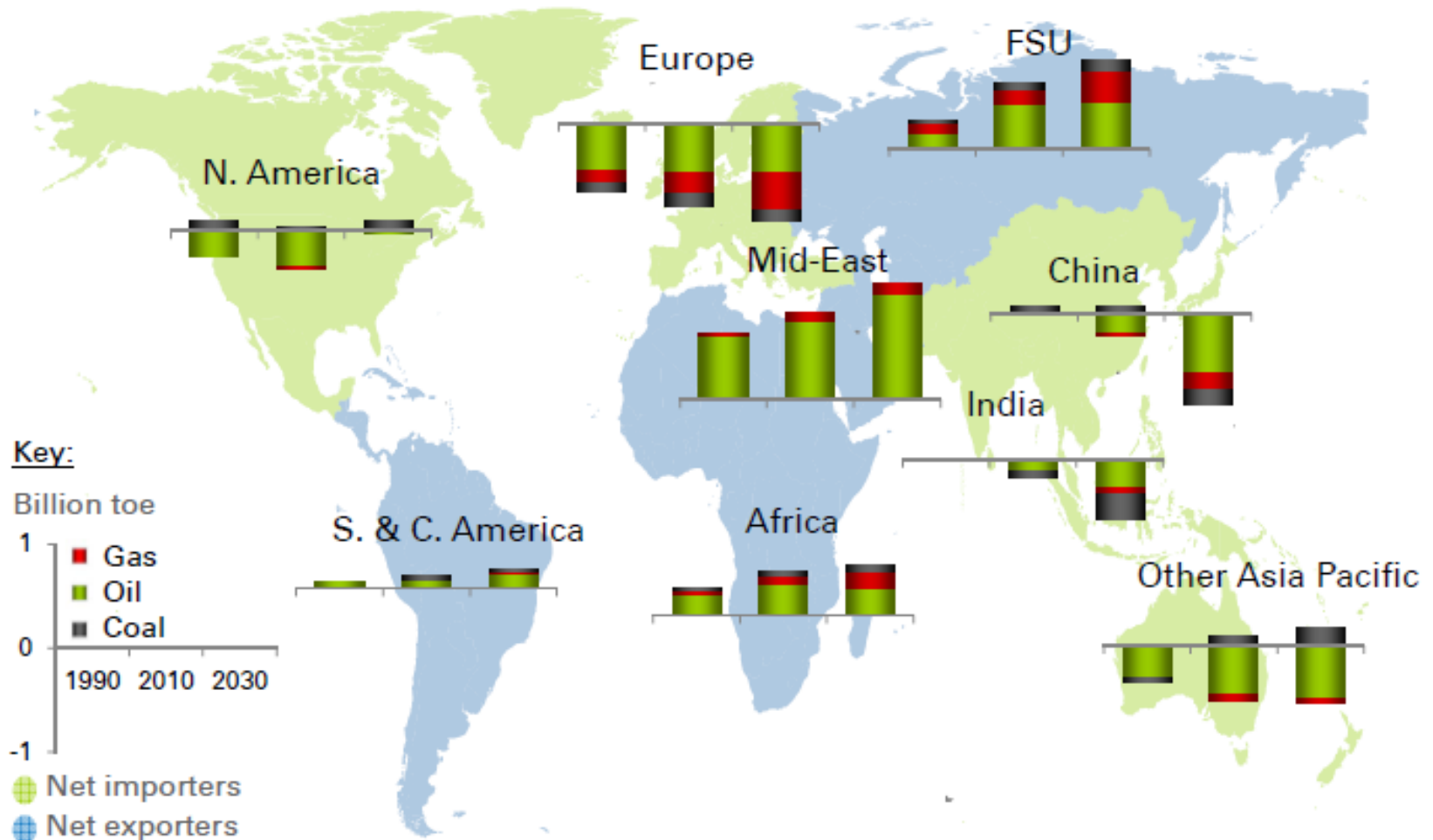
* Mostly related to declines in shale assets

FT (2012)

Unconventionals have also led to a revised view of global energy regionalism

- ⊙ IEA World Energy Outlook 2011 Early Release, June 2011
 - A Golden Age of Gas
 - “recoverable unconventional resources match conventional”
- ⊙ BP Energy Outlook 2030, January 2012
 - “Among energy importing regions, North America is an exception, with growth in biofuel supplies and unconventional oil and gas turning today’s energy deficit (mainly oil) into a small surplus by 2030.”
- ⊙ CitiGPS Energy 2020, March 2012
 - “North America, the new Middle East?”
- ⊙ IEA World Energy Outlook 2012, November 2012
 - “The global energy map is changing, with potentially far-reaching consequences for energy markets and trade. It is being redrawn by the resurgence in oil and gas production in the United States...”
- ⊙ US EIA Annual Energy Outlook 2013, May 2013
 - “U.S. dry natural gas production... outpaces domestic consumption by 2019 and spurs net exports of natural gas”

Self-sufficiency in the Americas, an axis of production and two blocks of demand



BP (2012) Energy Outlook 2030

Summary of the US shale gas revolution

- ◎ Shale gas has risen rapidly to over a third of US gas production
- ◎ Certain factors supported rapid growth.....
- ◎ these have declined and may not apply in other countries
- ◎ An industry boom has led to a bust in US gas prices while exports remain limited
- ◎ The “revolution” raises prospects for US energy “independence”