

Development of Energy Markets: An Outlook

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1. Energy and mining

Why the mining industry cares about energy

- Coal, uranium are mined. Hydrocarbons also come from extraction
- Mining, mineral processing and metallurgy are all energy intensive...
- ...thus heavily affected by developments in energy markets and policies
- Conversely, products of mining and metallurgy are extensively used in the energy industry: from steel to refractories to fracking proppants to rare earths for renewables

2. The energy market to mid '14...Key drivers

Global population ↑ plus new middle classes → more energy needed

...but with no major breakthrough in energy savings

Environmental movement, esp. re climate change & nuclear post-Fukush

Hydrocarbon prices: OPEC kept them high → shale → gas price ↓

Oil remains world's leading fuel, w/ 33% of energy consumption

Coal, world: 30% of primary energy needs, generating > 40% of electricity, used in 70% of steel. Σ production '13: 7823 Mt, a record.

By 2013, coal prices still at competitive levels. Since then, major problems for US coal, leading to *coal exports* fm the US

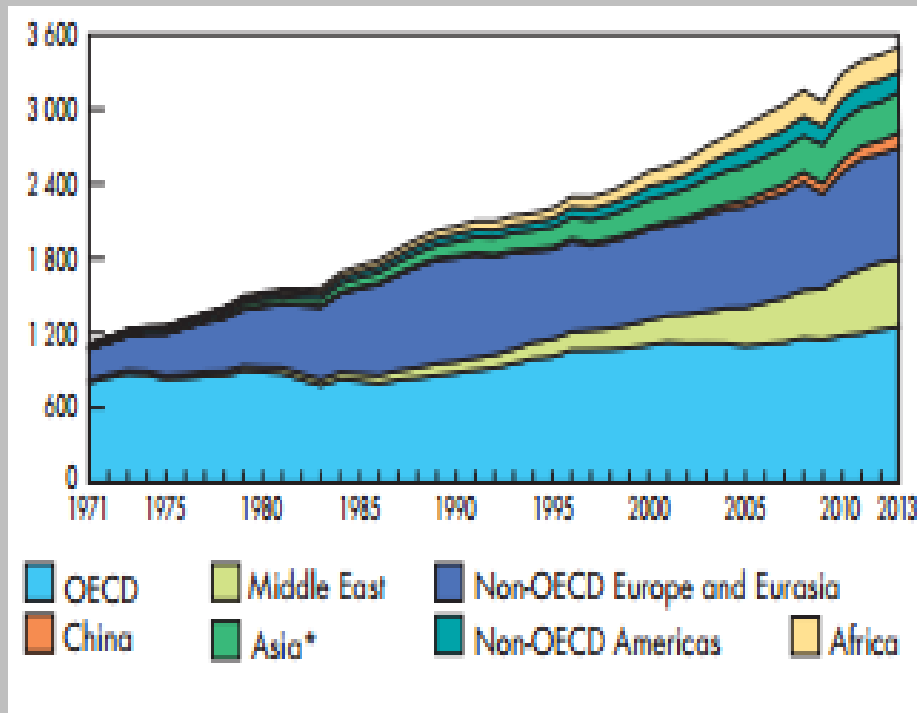
Renewables, world *in power & transport*: 2.7% of '13 consumption, a record [0.8% decade ago]; 5.3% of global power generation, also a record

Financing: mostly easy

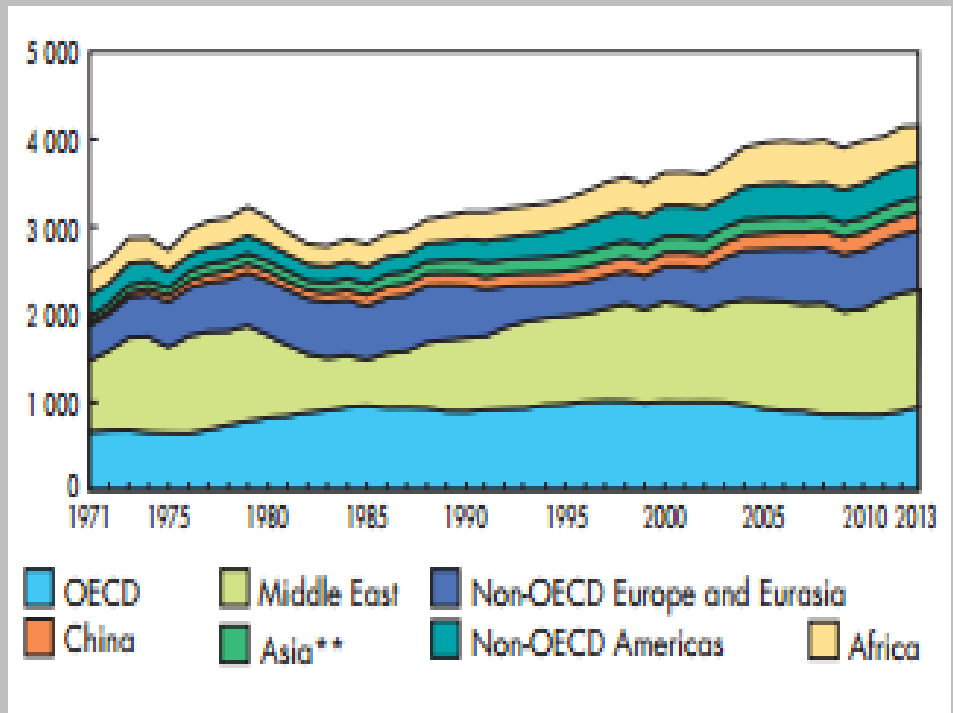
Geopolitics: extremely important

...2. The energy market to mid '14...

Nat gas production '71-'13
by region (bcm), OECD no1

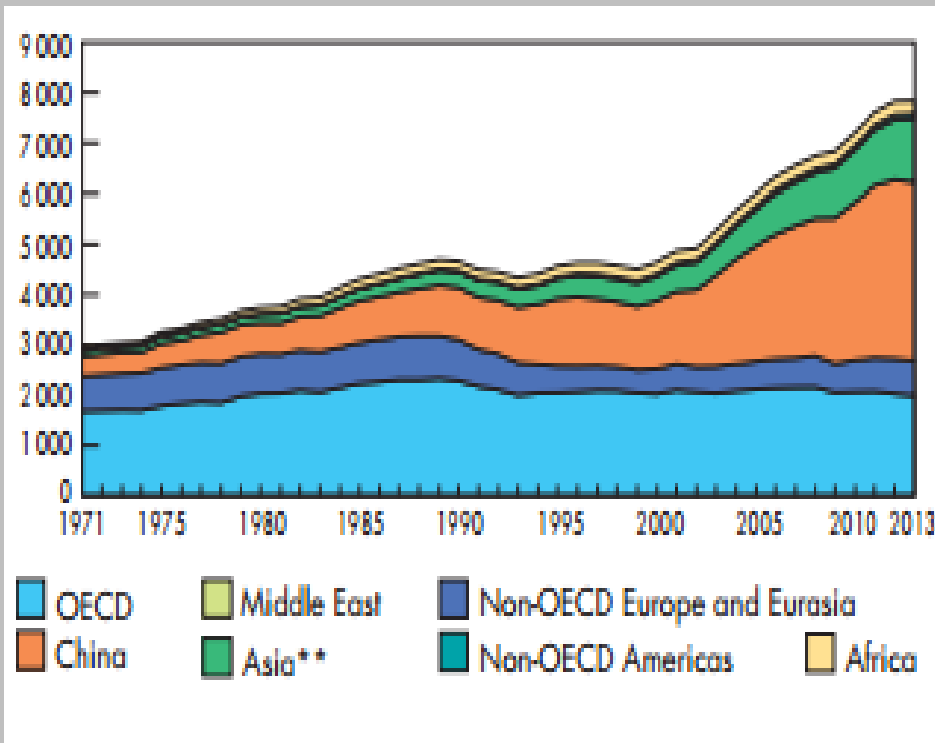


Crude oil production '71-'13
by region (Mt), M.East no1

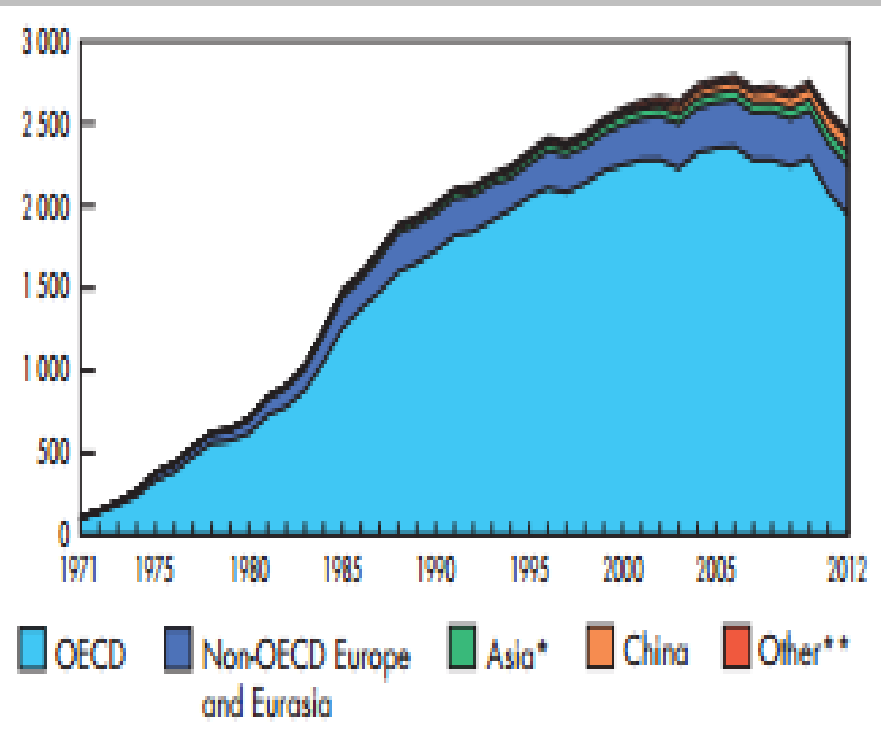


...2. The energy market to mid '14...

Coal production '71-'13
by region (Mt), China no1

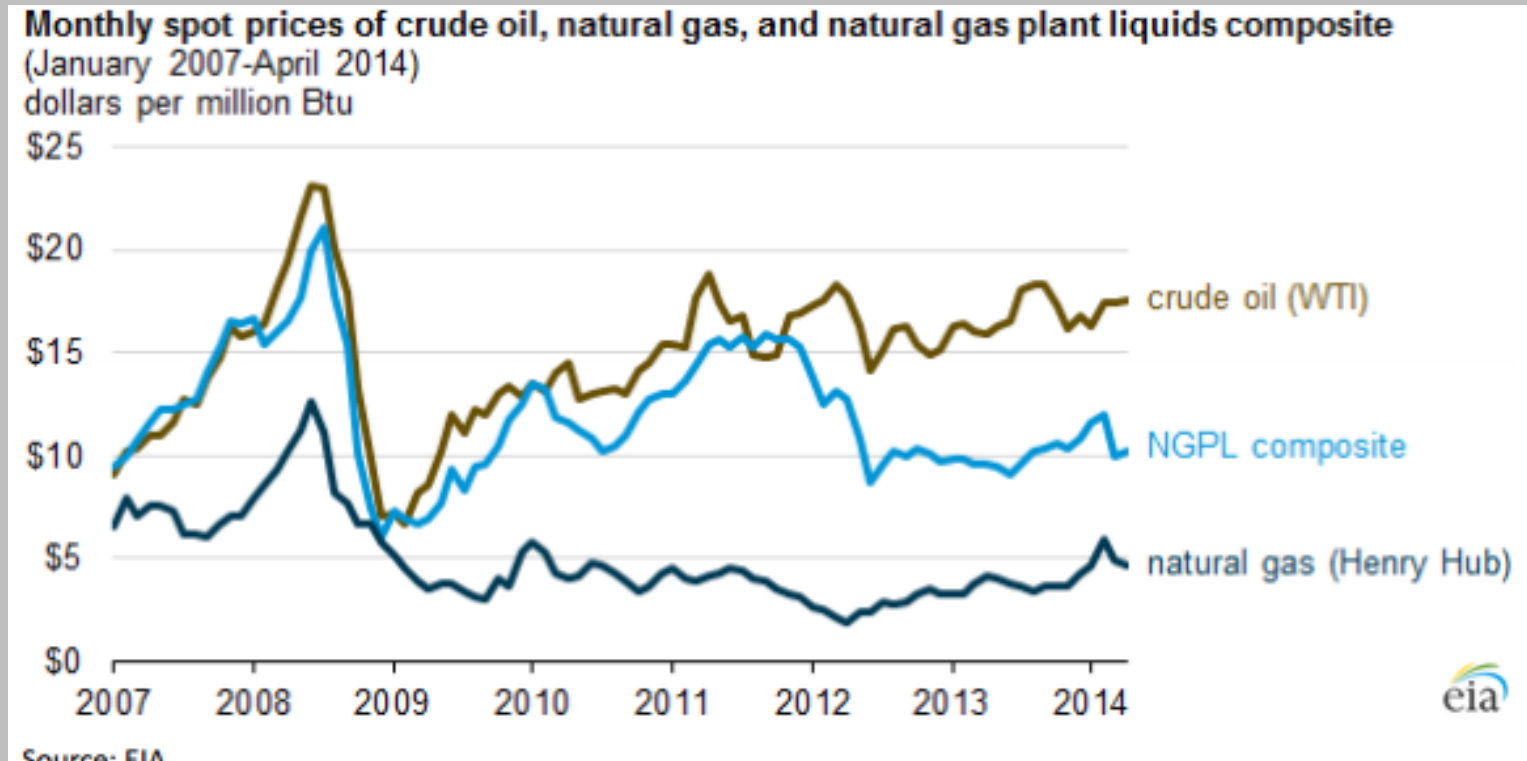


Nuclear production '71-'12
by region (TWh), OECD no1



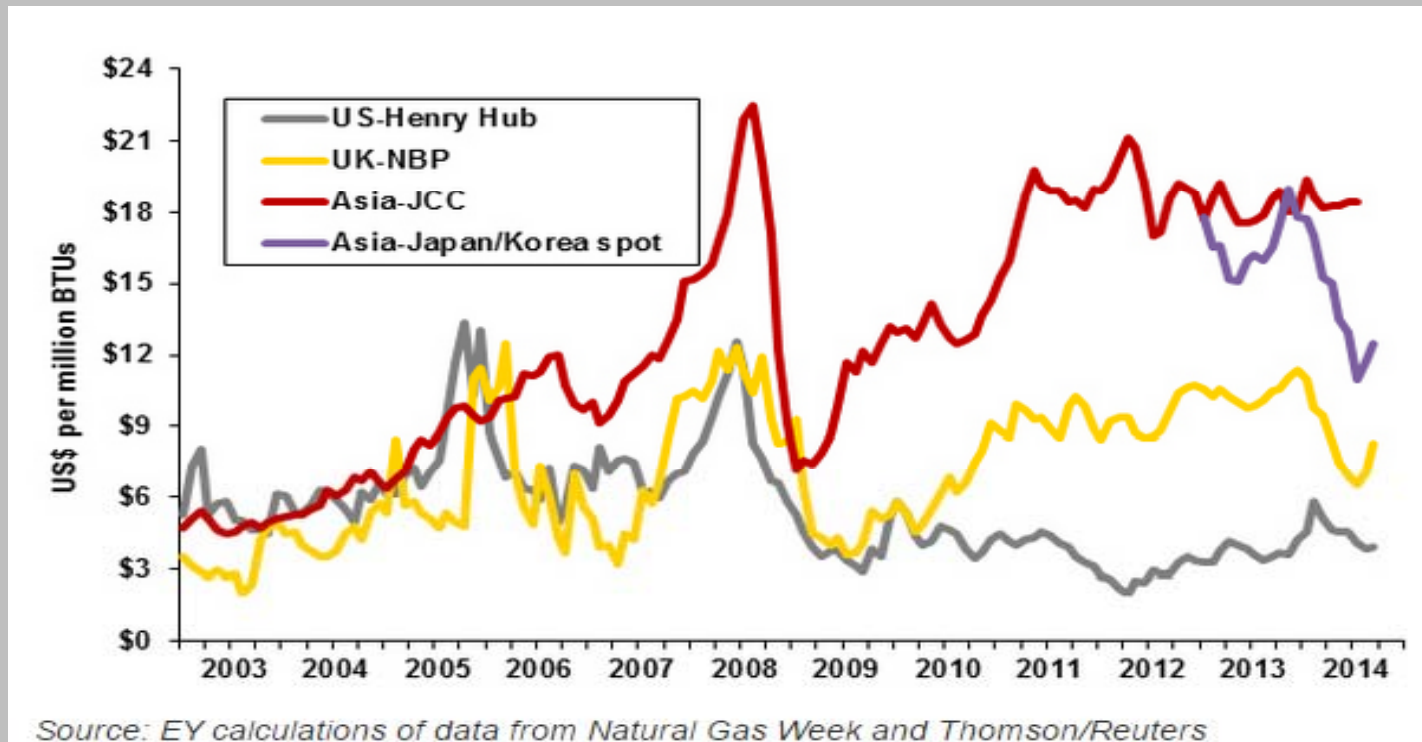
... 2. The energy market to mid '14...

Gas and oil prices, Jan '07- Apr '14



... 2. The energy market to mid '14...

Global Natural Gas Prices 2003-2014: The shale impact



...2. The energy market to mid '14...

Factors affecting the EU energy market

- Anemic economic growth in the EU
- US: fm oil importer to [oil & coal] exporter: impact on EU energy, eg on refiners
- Ukrainian crisis → EU/US/Canada sanctions against Russia
- Environmental issues & policies: energy efficiency↑, renewables subsidies↓, CCS funding, ETS/CL tighter incl. development of a methodology for assessing direct & indirect GHG emissions fm energy-intensive industries
- Nuclear, post Fukushima: shutdowns, phaseouts -- except in China

...2. The energy market to mid '14...

US & Canada energy markets...

- Economic growth higher than Europe's: higher growth rates, mostly due to policies such as QE: Fed lowered short-term interest rates to about zero in 2008 and has kept them there **since**.
- Unemployment in the US at **6.7%**
- Compare w/ **EU economic crisis: eurozone** unemployment **at near record levels of 12.1%**
- Canadian economy closely linked to trade with other countries

...2. The energy market to mid '14...

...US & Canada energy markets

The shale revolution

Technology, legislature, mentality...plus geological, geographic, industrial, financial and regulatory factors. Lead to:

Low gas prices, energy imports↓, pipelines & railroads to move oil and gas fm fields to processing/refinery plants ... and, for gas, to local distribution networks & customers -- some environmental concerns

Environmental policies

EPA: Inventory of US GHG Emissions & Sinks, GHG Reporting Program: collects & publishes emissions data

Energy Policy Act of 2005, Energy Independence and Security Act of 2007, Keystone XL Pipeline and Other Pipeline Legislation, Regulation of Power Plant Emissions and Global Climate Change, Energy Efficiency, Hydraulic Fracturing regulation

...2. The energy market to mid '14

China

- Coal: the largest energy sector, oil: 2nd, largest net oil importer by 2014
- Total wind capacity of 98 GW in June 2014, China's oil consumption growth 1/3 of world's oil consumption growth in 2013
- Govt opened up renewable energy to private & foreign investors.
China world's largest PV market in June '14

Russia

- Entire economy dependent on oil & gas production: oil revenues 45 pct of govt budget in '14
- 4th-largest generator of nuclear electricity in the world
- Set for 1.5GW of solar by 2020

3. Developments since June '14...

- Global population keeps rising
- Middle classes keep being created, especially in Asia
- Global coal market in doldrums, due to excess supply & fundamental shifts in the US energy mix toward gas and new coal mining projects
- Energy savings + _
- Environmental pressure continues. eg now some form or other of ETS in EU, EFTA, US, Canada, China, S.Korea...but not in Russia, Brazil, Australia
- US lobbying **for** [shale producers] and **against** [Dow etc] US exports
- Low oil prices an opportunity for removing consumer fossil-fuel subsidies
- Project funding is tighter, even with record low interest rates
- Geopolitics: even more important

...3. Developments since June '14...

...Plus, suddenly

- Dramatic & unexpected fall in int'l oil price: 40% Jun to Dec '14, to below \$70 -- since then: at 50-60
- US/Canada shale is hit: US/Canada shale is hit: Feb 23 '15 Baker Hughes rig count reaches lowest point since Jan 22, '10
- US exporting distillates
- Sanctions against Russia continuing: Jul '14 new US sanctions on Rosneft [oil prod], Novatek [gas prod]. Sept '14: EU sanctions on Transneft, Gazprom Neft. Feb '15: EU measures on 28 Russian officials or organizations. Feb '15: Canada new economic sanctions and travel bans. Shale technology, equipment & financing↓↓
- Concerns raised as China steel enters 'peak zone'
- SA power cuts threatening mining output

...3. Developments since June '14

Low oil prices

favor: households, industry esp. steel/fertilisers/cement/plastics/basic petrochemicals, transportation incl. autos, retail; importing countries eg Turkey

• *do not favor:* oil companies, coal, high-cost shale, renewables, high-cost oil exploration eg Arctic, nuclear [Areva warns of €4.9bn full-year loss, project delays, weaker demand]; Russia/Venezuela/Iran/Azerbaijan [devalued currency by 1/3]/Nigeria

mixed impact on: industrial minerals, low-cost shale

Canadian oil sands producers hike output despite dim crude price Feb 20 '15

Recent uptick in prices: Gas prices ↑, oil prices rebound on signs of output cuts Feb 2 '15

4. Outlook...

The market

- Bears: 20-30 USD/bl. Today: emergence OPEC meeting discussed
- Bulls, eg BP, EIA's Birol : low prices will lead to [a] consumption↑ and new capacity investment↓ → oil price could reach 200

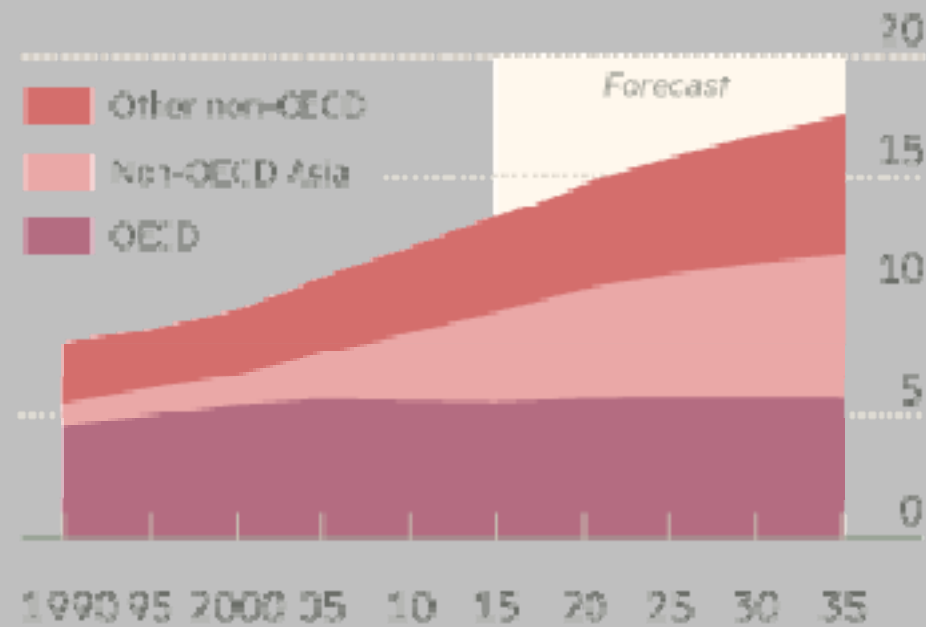
Public policies

- EU: recognition of a “lost decade” for low-C investment...MSR in 2021 to tackle permit oversupply, that depressed C price...EC & EIB launching new financial instruments, towards investment in energy efficiency, efforts to preserve natural capital, adaptation to climate change
- US: Obama seeks \$2bn in climate change inv, Feb 10 '15...More global funding needed for CCS technology, Obama '16 budget urges US states to cut emissions faster, Feb 2 '15...Upcoming free-trade agreements → easier for US companies to export gas & invest in shale gas and tight oil production overseas

...4. Outlook...

Primary energy consumption

Tonnes of oil equivalent (bn)



Source: BP Energy Outlook 2013



4. Outlook...

Gas: a good interim transmission to low carbon economy

Oil: ?? driven by economic & geopolitical factors. Greenspan Feb 19 '15: 'Opec has ceded to the US its power over oil price' [!]

Coal: good future in China, India. Elsewhere: clean coal, CCS etc

Renewables: ↑, even without subsidies...but there is a big need for R&D in electrical energy storage; biofuels: 3rd generation makes sense

Shale: ↑, even in US/Canada, if the oil/gas prices are right.

Technological improvements eg waterless fracking. Elsewhere: growth potential in Argentina, China, UK, Russia

Nuclear: slow progress, if at all, except in China. Even French Senate debates bill Feb '15 'to cut reliance on nuclear by 50 pct < 2025'

...4. Outlook

But all this depends on what happens to the world economy...
...starting with China

- Could India take over the role of China as the world's growth engine?
- There is an 'asynchronism': USA, Eurozone and China are in very different phases of the economic cycle → policies are different. Same problem inside the Eurozone....
- ...but according to others [Krugman] it is the other way round:
 Δ policies → Δ economic outcomes
- If the world economy slows down [despite QEs], energy demand will continue falling. 'When the going gets tough, only the tough get going'.
- In the energy case these will be Saudi & Gulf allies, China [with coal]; also some US shale producers esp. if large-scale exports are allowed.

Thank you very much
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