

How is the next generation motivated
by oil industry of 2015 in CEE region

Conference

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RECENT CHALLENGES OF THE MODERN PETROLEUM UPSTREAM



Attila HOLODA
managing director

Society of Petroleum Engineers

„Oil fields never die!”

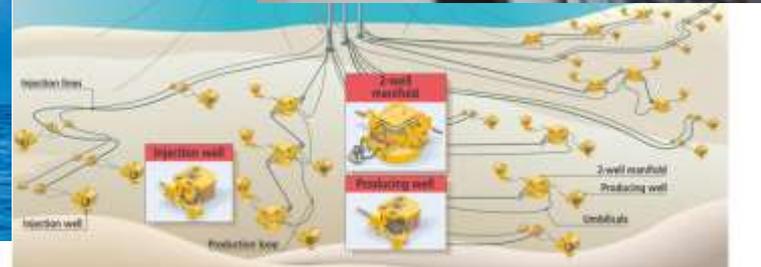
/prof. Zoltan Gyulay/

Recent challenges in the international Upstream I.

New areas, new technologies: unconventional approaches is needed



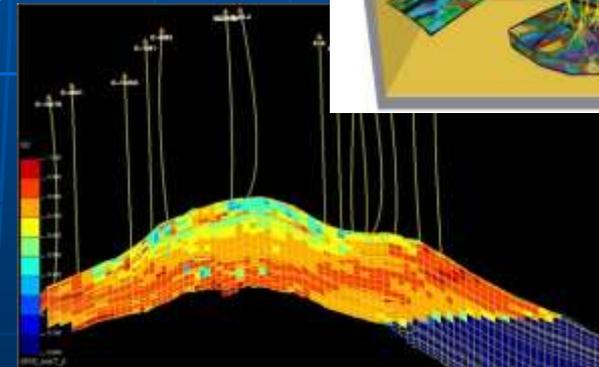
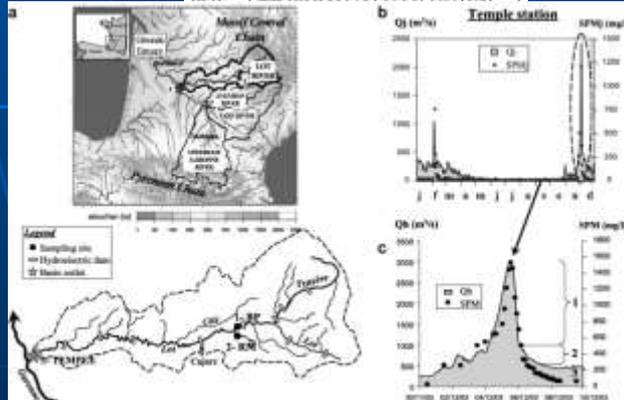
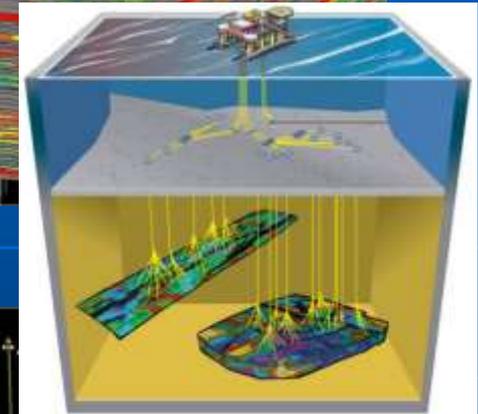
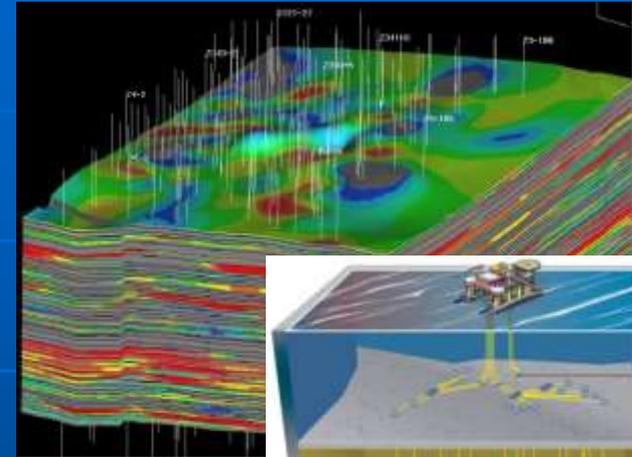
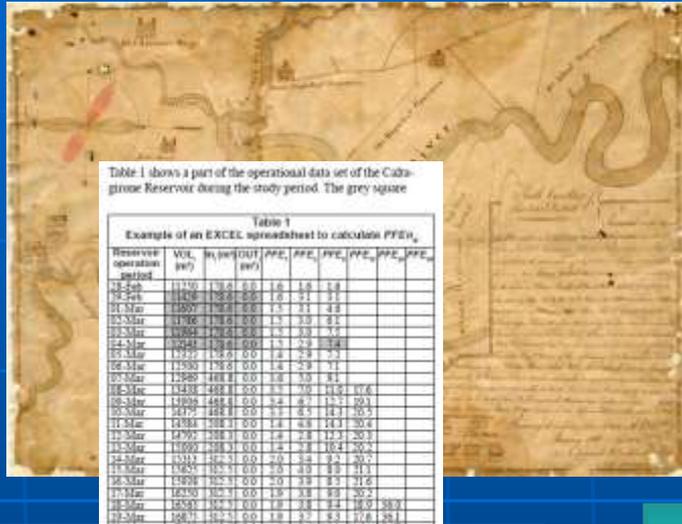
Source: Canadian Centre for Energy Information



In facing to growing challenges no way to think conventionally, non-traditional mindset are required!

Recent challenges in the international Upstream II.

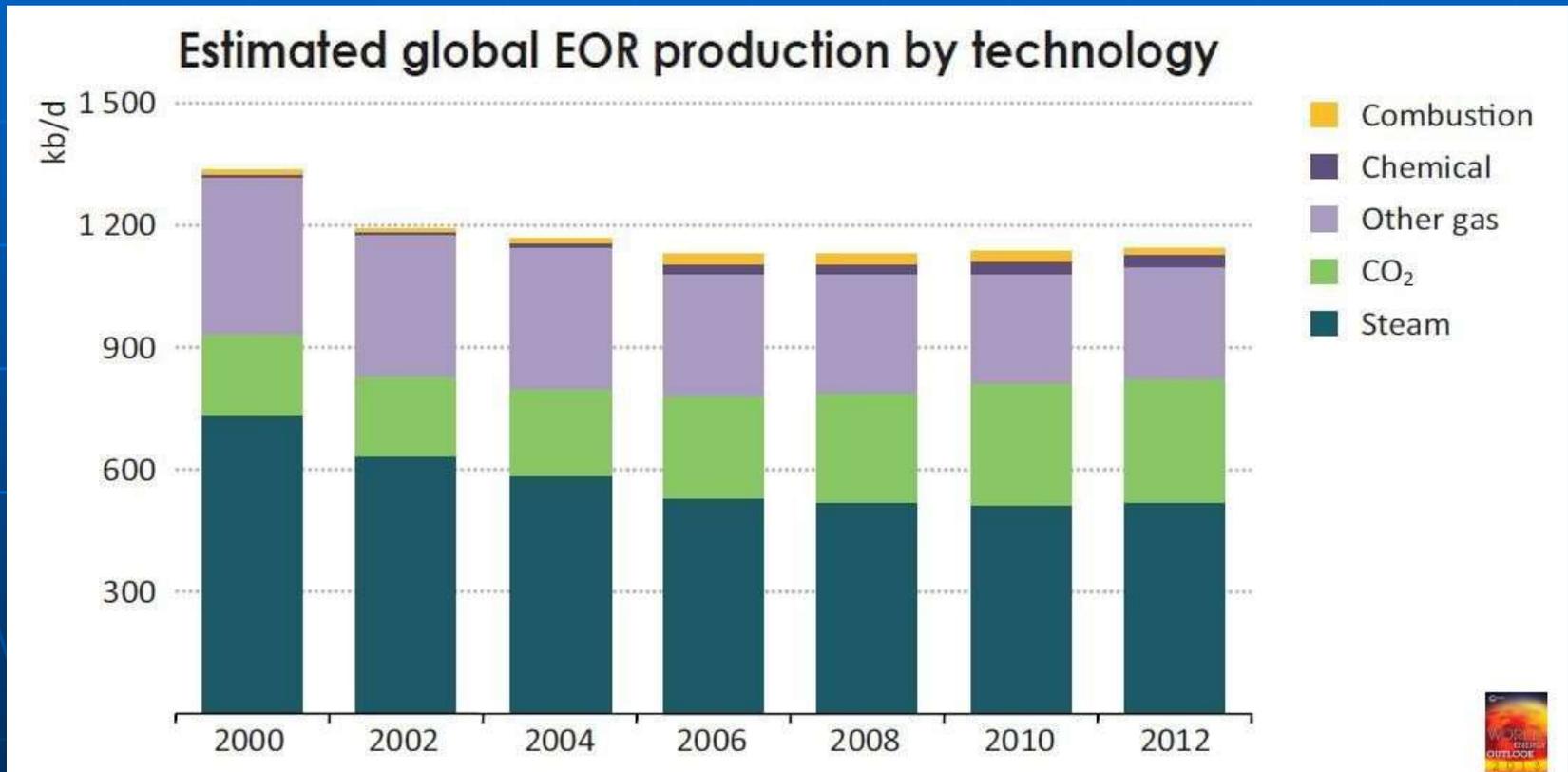
Reservoir management: PC supported reservoir simulation, screening and focus of EOR/EGR/IOR



Applying interdisciplinary geosciences and developed reservoir methodologies, we can more and more accurately estimate the reserves and determine the applicable technology!

Significance and spreading the EOR/EGR and IOR methods

Since the average size of discovered reserves declines sharply, it may make sense going back to the more efficient recovery of our matured oil and gas reservoirs...



Increasing recovery factor on the known reserves with applying any secondary/tertiary methods, we could reach up to 1.1 million bbl/day surplus production!



Recent challenges in the international Upstream III.

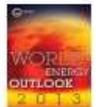
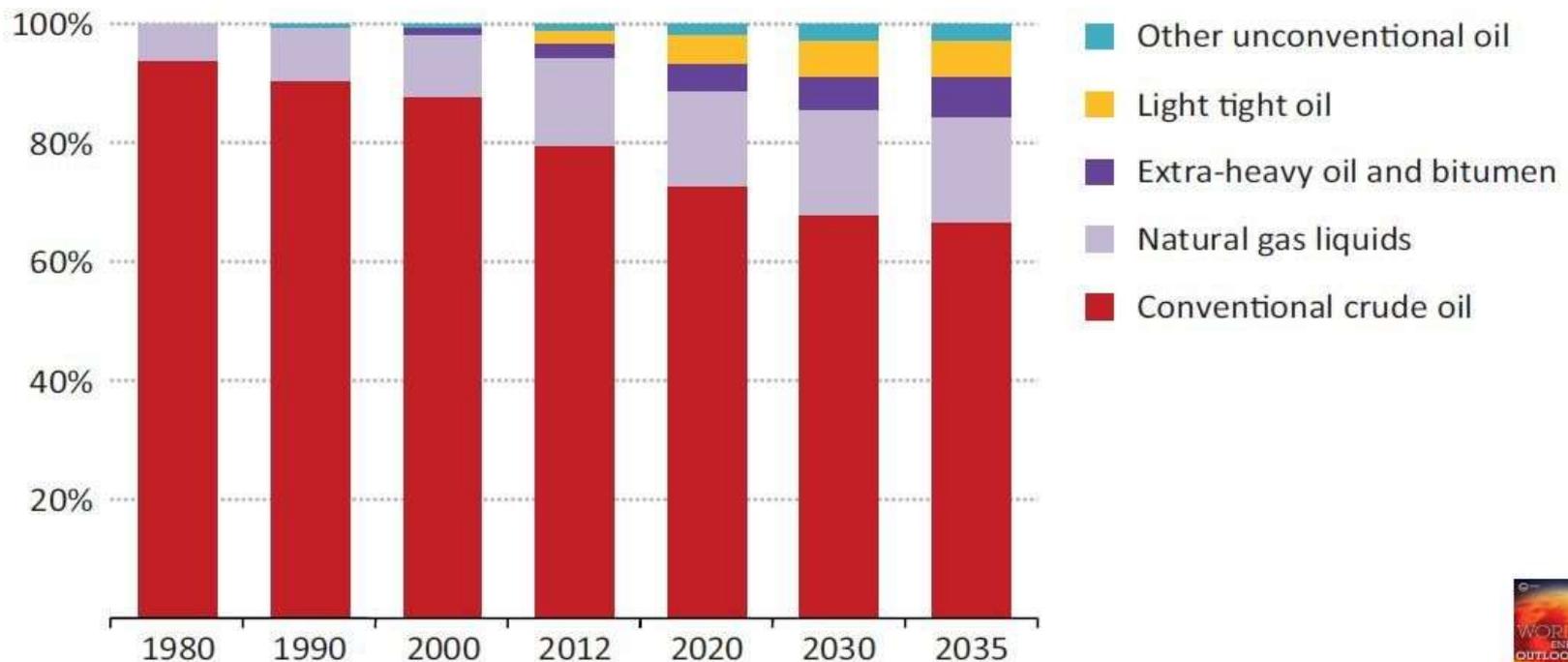
Drilling: Technological development is ongoing, drilling and other workover with CT



In addition to the development of the methodology and technical improvement of the geotechnical sciences, and lifting and drilling techniques become outstanding!

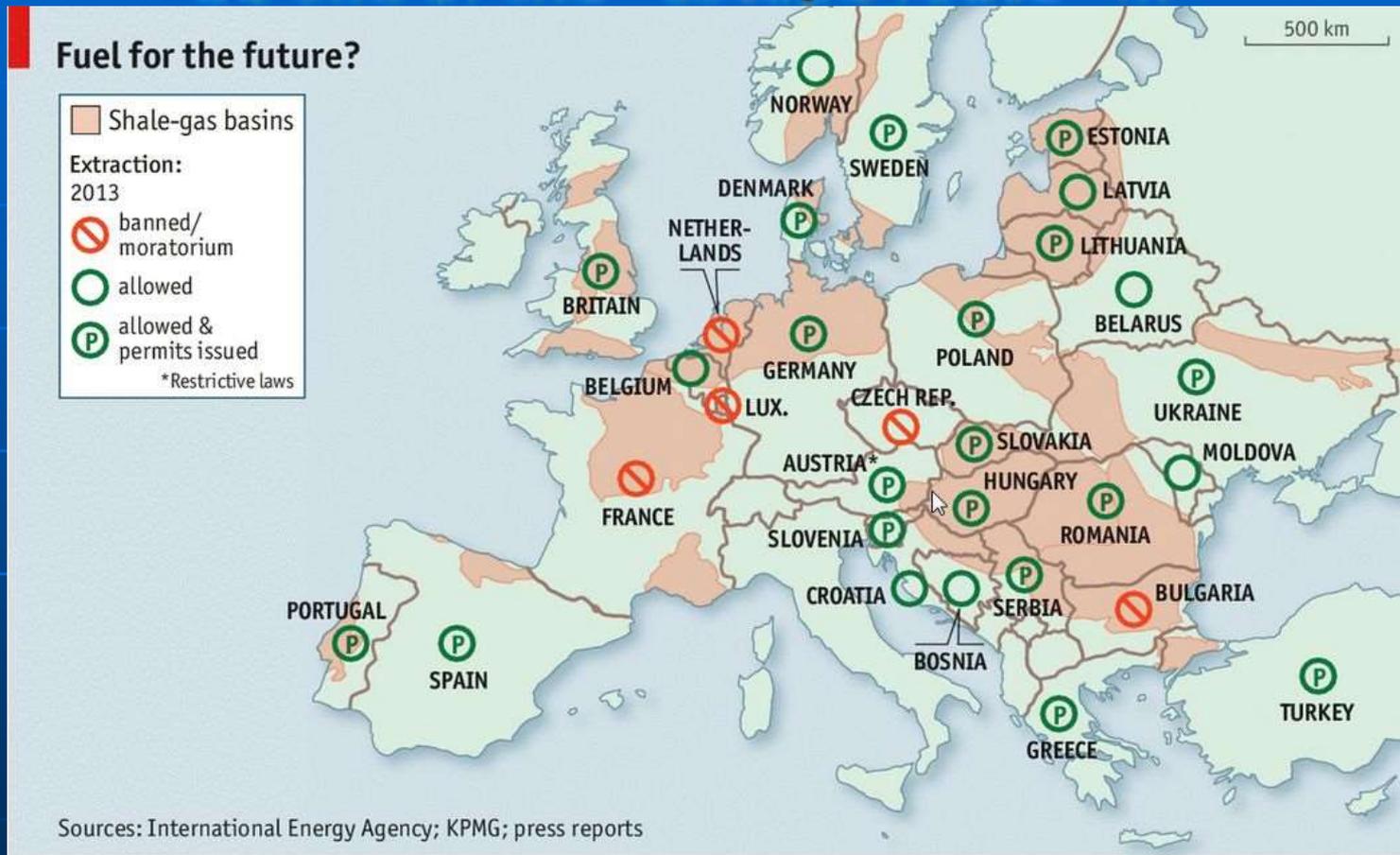
Previous focus on the conventional reserves is shifting to unconventional resources in oil and gas areas

Shares of world oil production by type



Accessing to exploitable resources requires permanently increasing efforts and resources

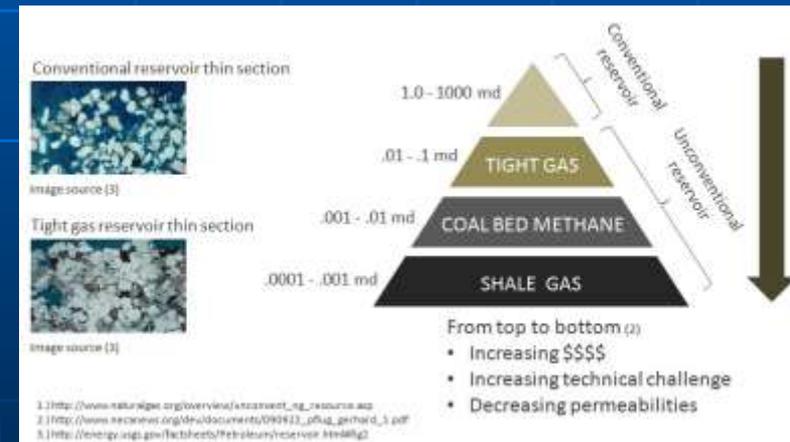
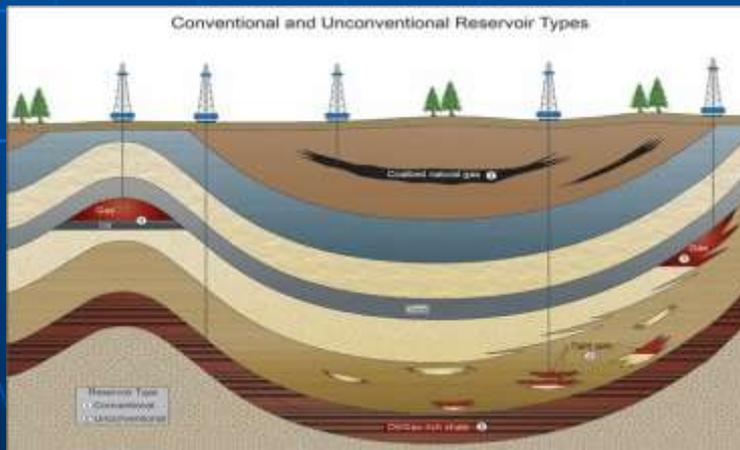
In addition to the multiplication of the number of LNG terminals, the European shale gas-story may be one of the "escape route" ...



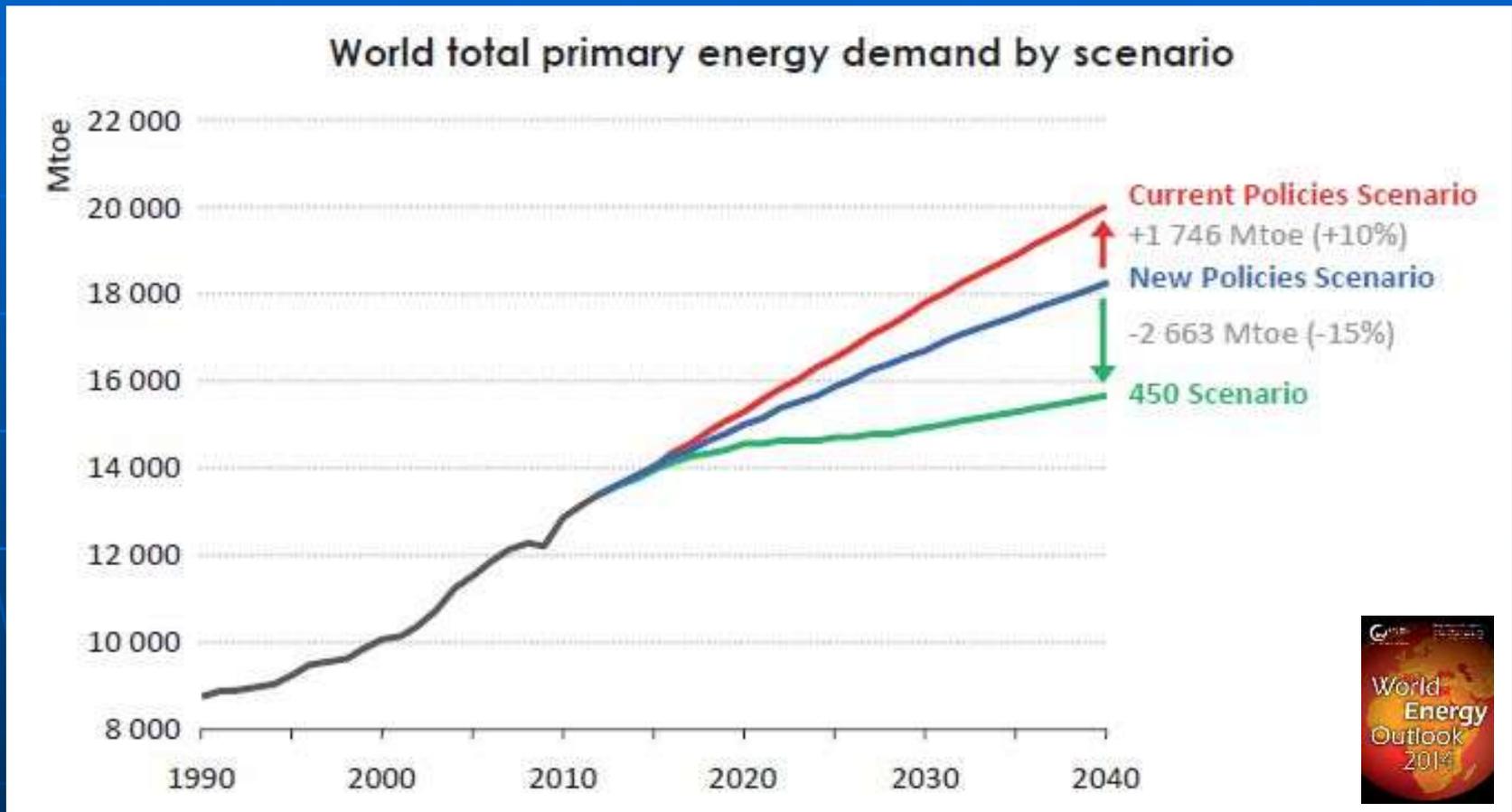
The verbal concept of shale gas-story is strong in the EU, in deed, however, is quite weak!

Some important facts by way of introduction ...

- ❑ ... The shale gas is neither better nor worse by quality than the natural gas, but **their are the same.**
- ❑ The unconventional gas **„only“ differs by** its origin, location, accessibility and in production methods from the conventional ...
- ❑ The vast majority of **unconventional resources are not able to be mined** from the economical aspect, although technically it would probably be feasible!
- ❑ Shale gas is also unconventional gas, but at the same time **not all unconventional gas is shale gas!**
- ❑ All the applied technologies (cementing, horizontal drillings, hydraulic frac, etc.) used in the unconventional industry are **based and came from the conventional oil and gas E&P!**



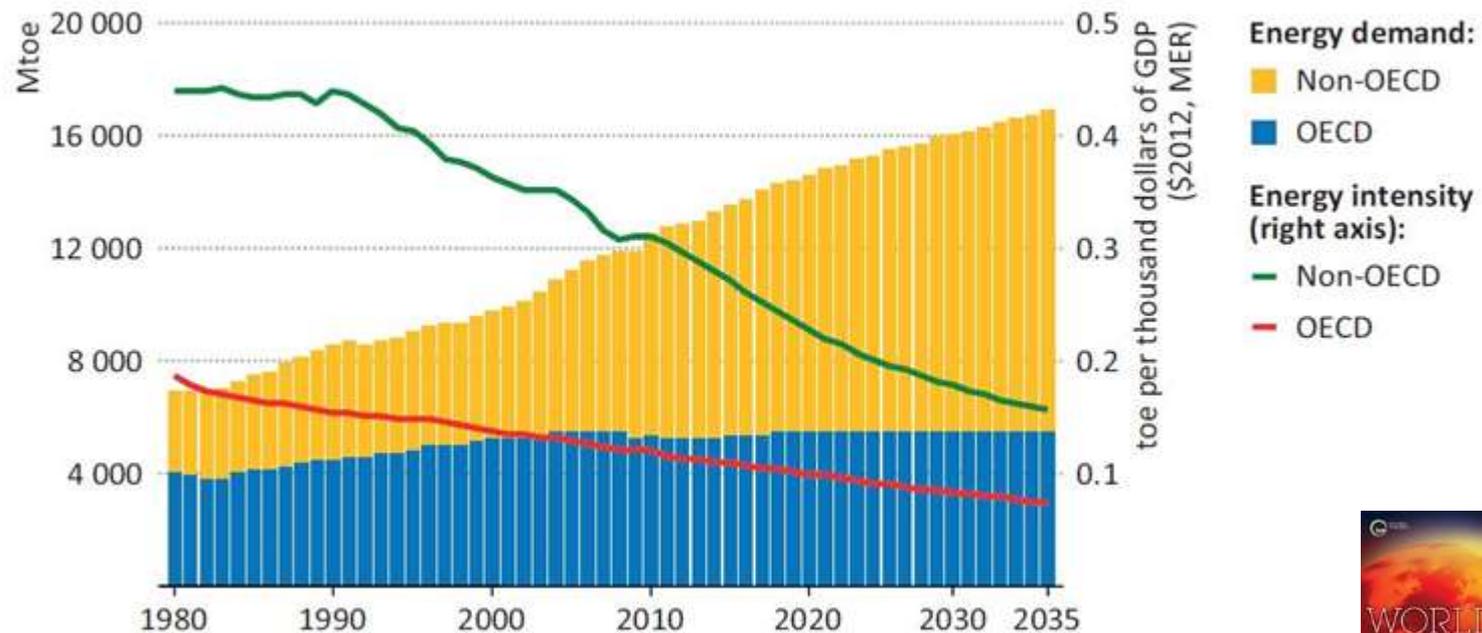
Forecasted trends in global primary energy demand until 2040 by IEA



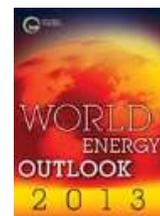
There is no realistic scenario what would not count on increasing of the global demand for energy!

The non-OECD emerging countries play leading role in the primary energy demand growth with their accelerated economic development

Primary energy demand and energy intensity

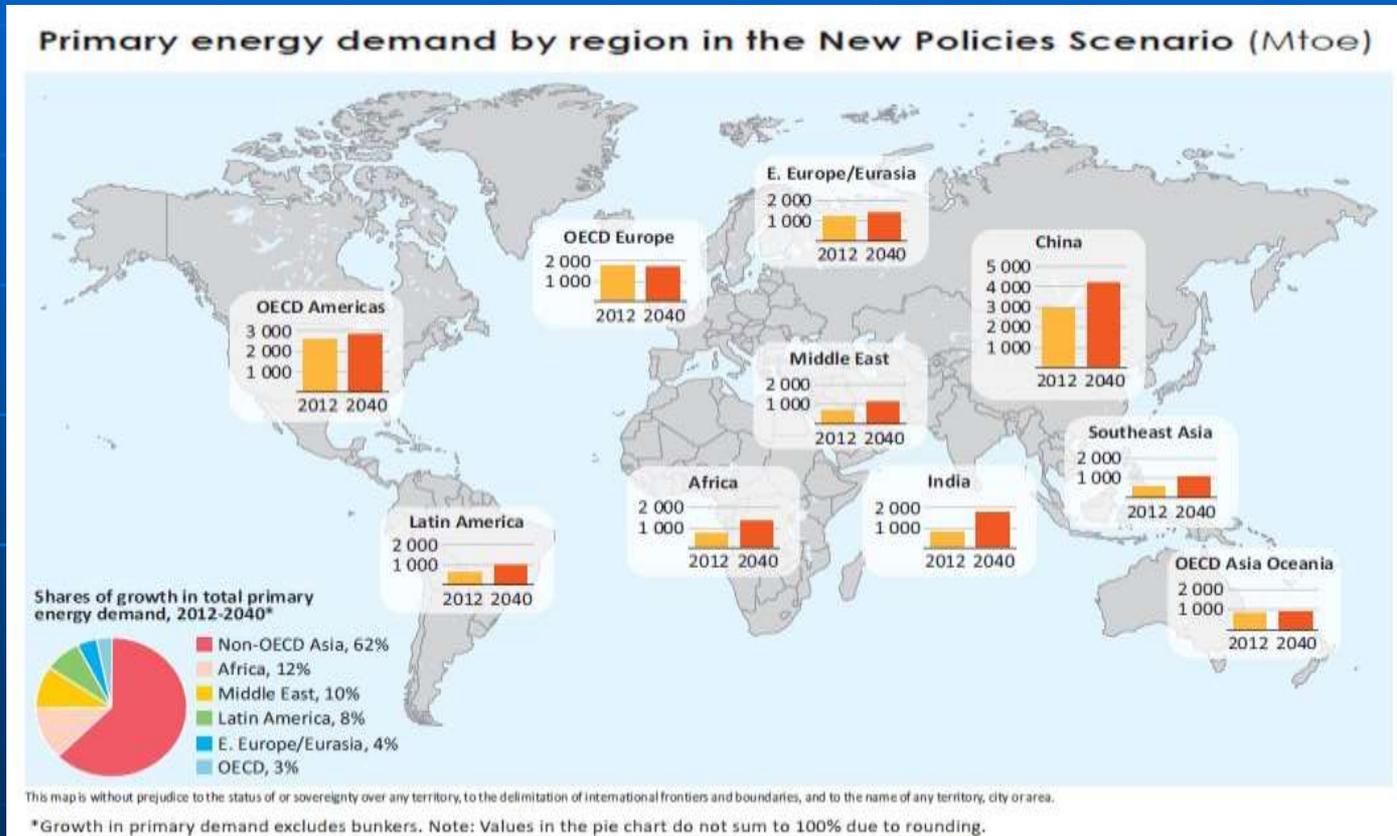


Note: toe = tonne of oil equivalent; MER = market exchange rate.



Dynamic GDP increase in non-OECD Countries naturally associated with a dramatic increase of their energy demands!

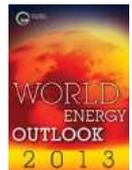
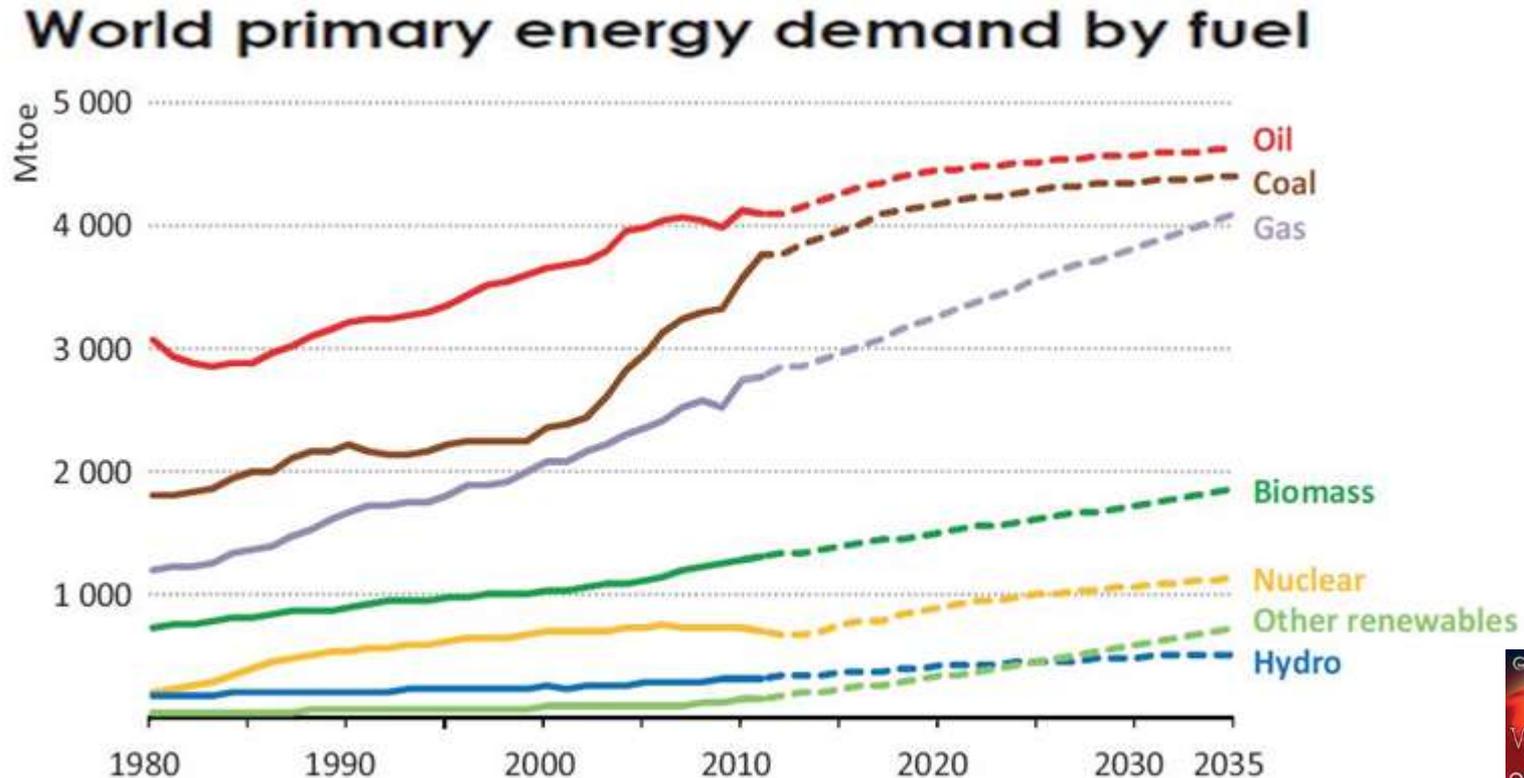
Completely different picture today of the Earth's energy map, then it was even 5 years ago



Source : IEA

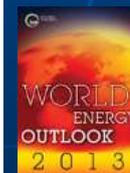
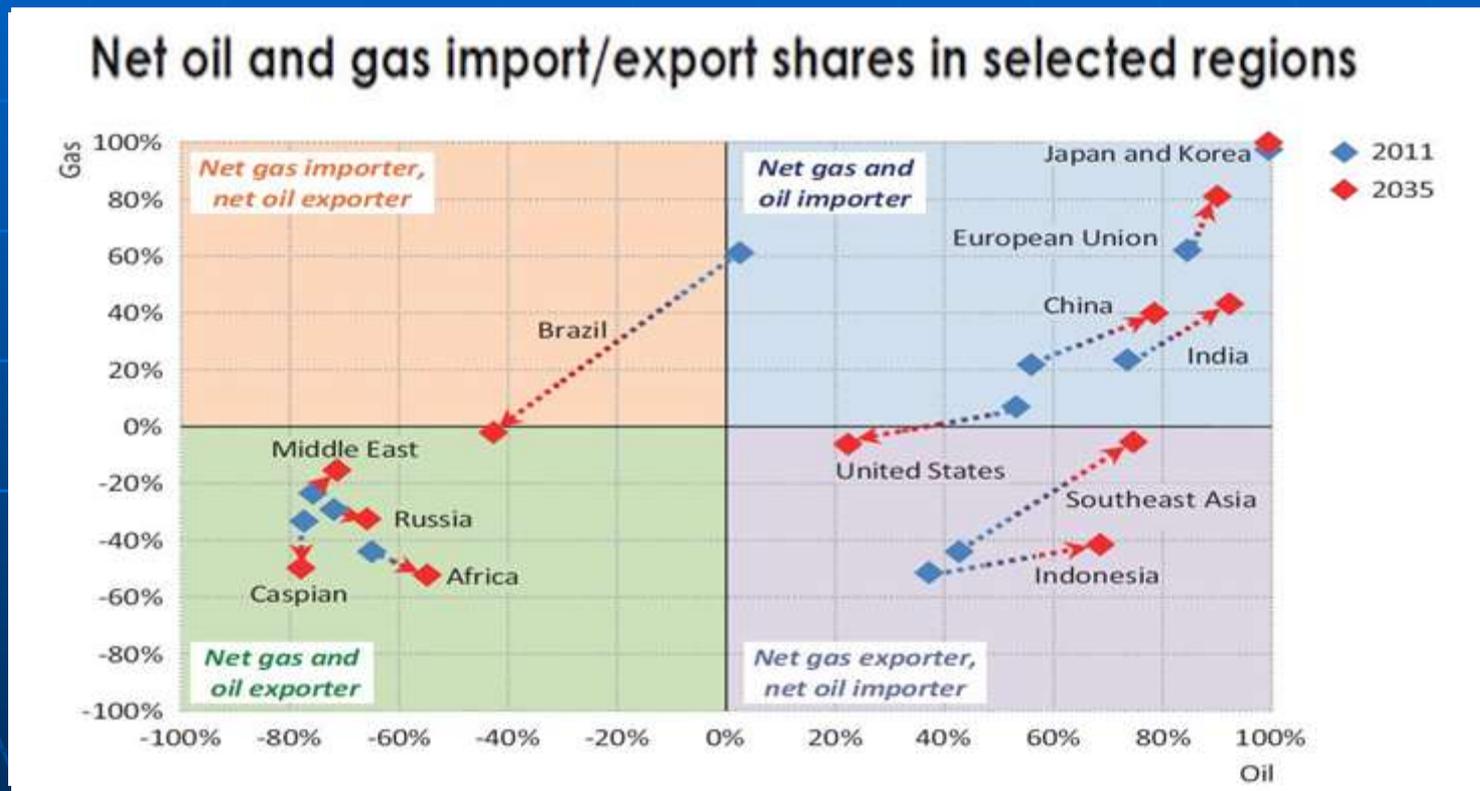
India's consumption will soon catch up of the EU's total energy consumption, while China will require a greater than 2.5 times as much energy!

Within the energy mix, fossil fuel's dominance is considered stable



In addition to the coal and renewable energy sources increase, the incredibly fast growth of the gas' share is the most striking!

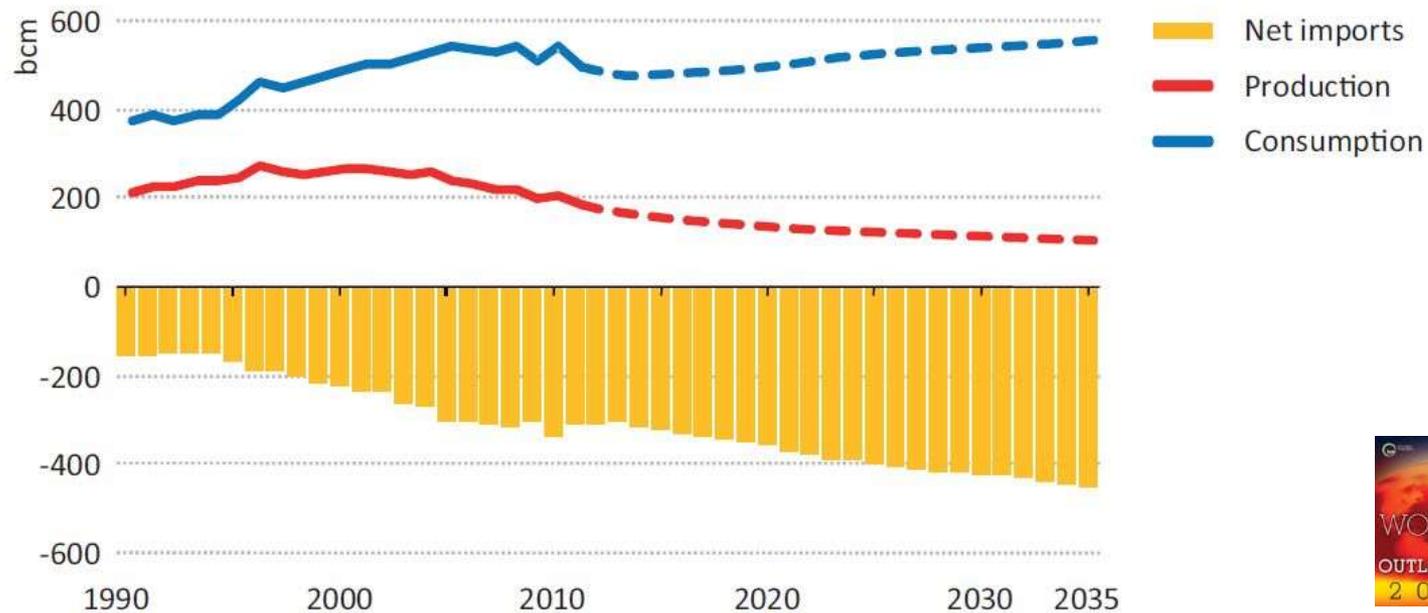
The resources of fossil fuels seem even more than enough for a long time, but a significant realignment is ongoing at the import / export picture even at the expense of the EU...



The most of OECD countries exposure is growing as well as Chinese and Indian exposure, while the position of the producing countries will not change substantially!

**There is only consensus among the visions:
the global demand for natural gas will increase by 2040,
Whilst EU suffers due to lack of new discovered resources!**

Figure 3.8 ▷ European Union natural gas supply and demand balance in the New Policies Scenario

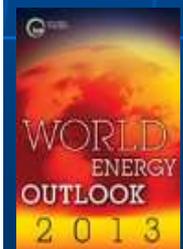
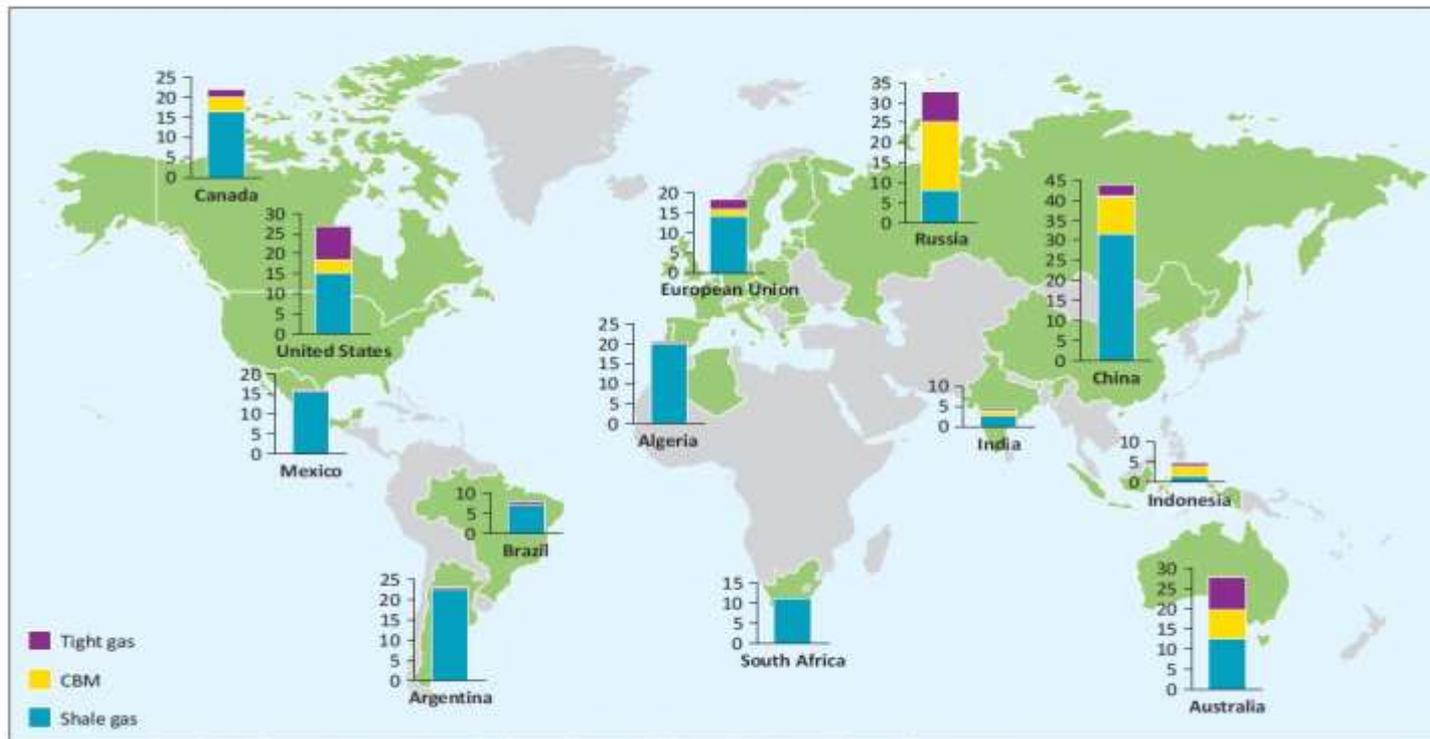


While Europe would have the opportunity to strengthen its own energy resources, the EU bureaucrats are able to think only in regulation of market positions!

What might be the significance of unconventional hydrocarbons?

The unconventional natural gas has **the growing role** to meet demands.

Figure 3.5 ▶ Remaining unconventional gas resources in selected regions, end-2012 (tcm)

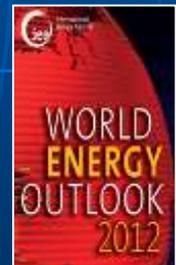
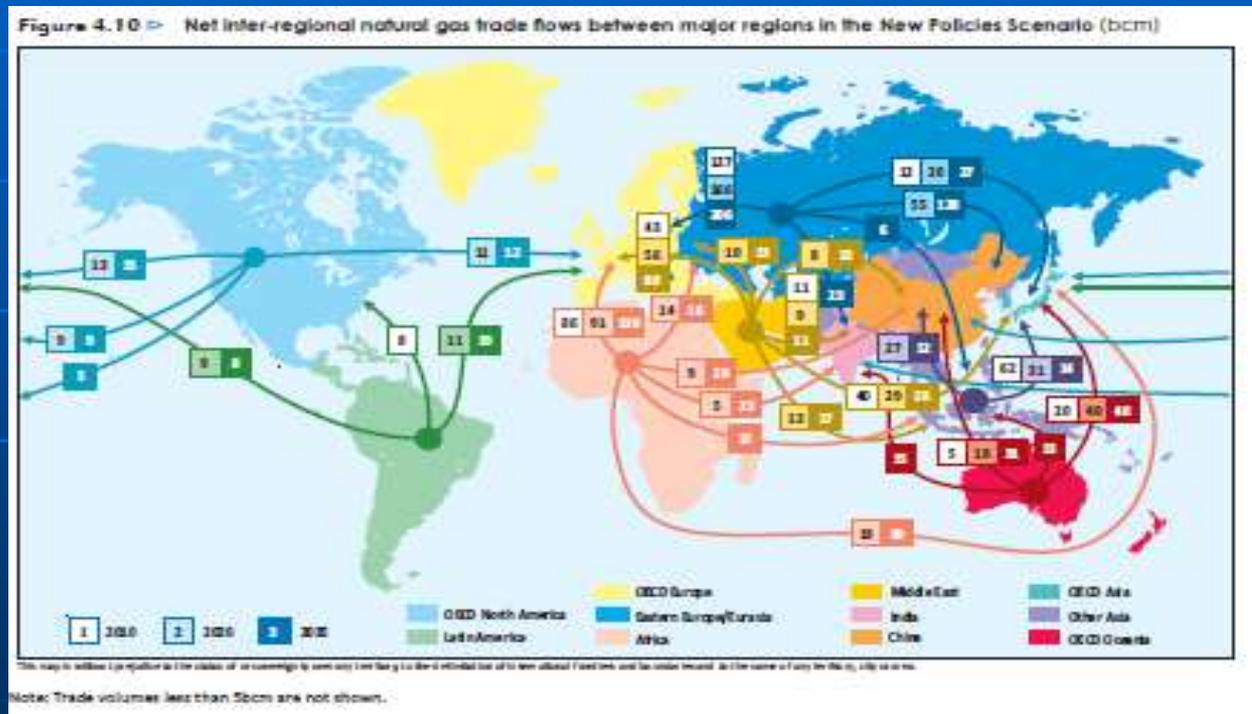


Source: IEA

Today mainly the American continent is soaring, but the other areas also will require soon a considerable amount of unconventional resources to involve into the secure gas supply!

Worldwide gas trade realignment is ongoing

The unconventional natural gas and - partly based on that - LNG production has now been **resulted a major rearrangement**: almost everyone (Russia, Middle East, USA, Africa, South America, Australia, South-East Asia) exports, while the EU, China South Korea and Japan are importing!

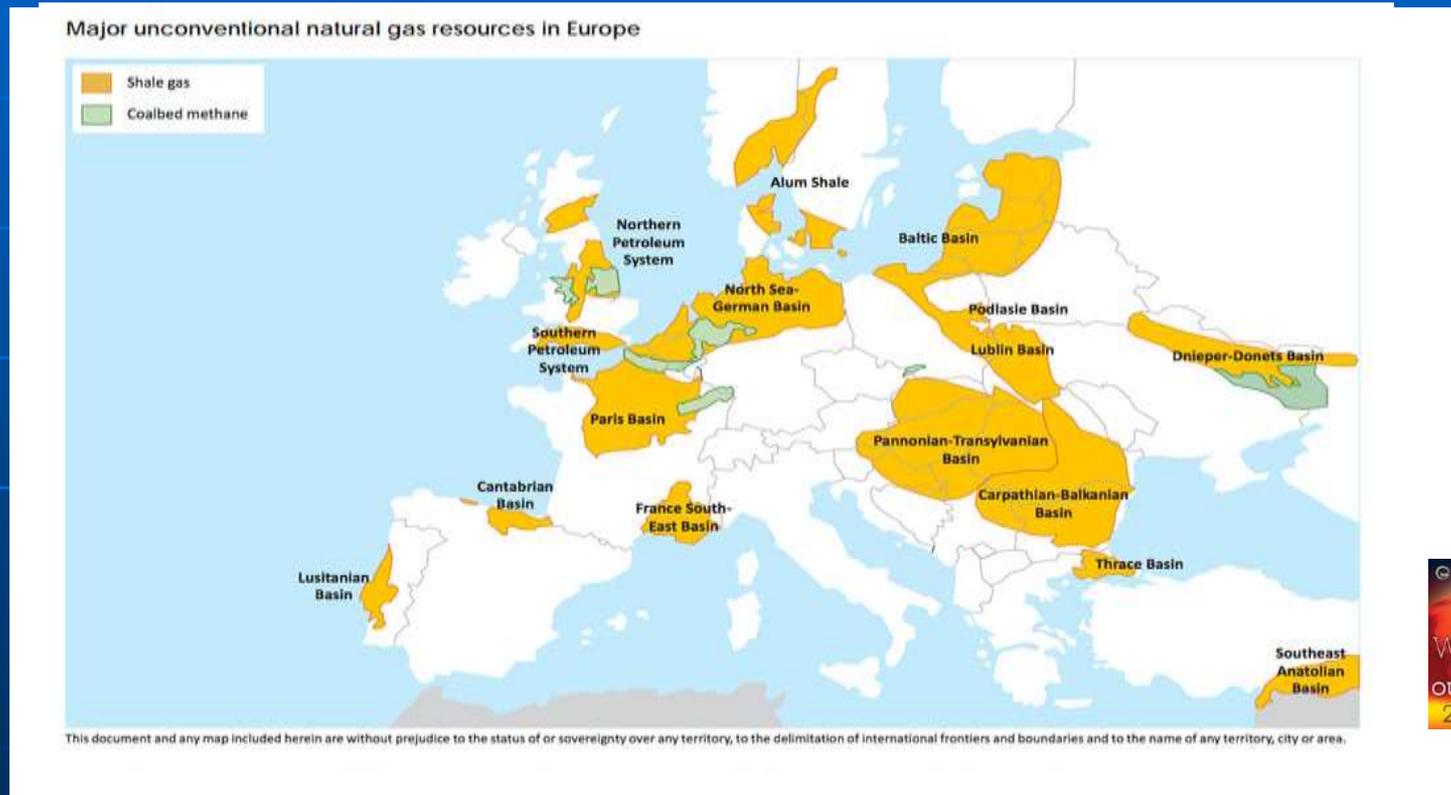


Source: IEA

Nowadays, Europe is clearly the biggest „loser“ of the market restructuring, because it earns "only" as consumers, but not as the final beneficial of the economic growth!

What is the current situation in Europe?

Diversifying Europe's supply of natural gas through domestic and imported natural gas, including that produced from unconventional formations, will become increasingly important, meeting more than 60 per cent of the increase in natural gas demand by 2040....



The IEA estimates there are about 331 trillion cubic meters of technically recoverable unconventional gas reserves around the world, with around **21 trillion cubic meters found in Europe.**

Permit systems within EU are not fully harmonized, but the relevant EU-directive has already become supportive

The geological factors may make shale gas in the EU more expensive to produce, and there are also infrastructural challenges. Other challenges include **greater urbanization** in the EU, and **different land ownership rights** from those in the US....

The **German** coalition government proposes legislation to improve the protection of groundwater, require an EIA for the exploration and extraction of unconventional resources through HF and a restriction/prohibition on the use of ecotoxic chemicals in HF operations.

Poland is recognized as another EU frontrunner in shale gas development. This is due to the combination of political will and in the case of Poland, potentially favorable geology.

UK: Since December 2012 the Government has continued to demonstrate its support for shale gas.

France: shale gas activity was suspended in July 2011, with a ban on the exploration and exploitation of hydrocarbons by hydraulic fracturing and the cancellation of exploration permits which had been granted.

Hungary: politically supported, royalty's been reduced to 2%, but the environmental permission of HF is still highly complicated.

Confirmation of **Romania's** unconventional gas resources is expected to take about 5-8 years.

Bulgaria: the shale gas E&P is banned without any further chance to review...

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

The EC noted that shale gas and other unconventional gas sources have become potential important new sources of supply in or around Europe which could potentially lessen the EU's import dependency.



**Thank you
for your kind attention!**

aholoda@auroraenergy.hu
<http://www.auroraenergy.hu>

Good luck!