Global energy shift

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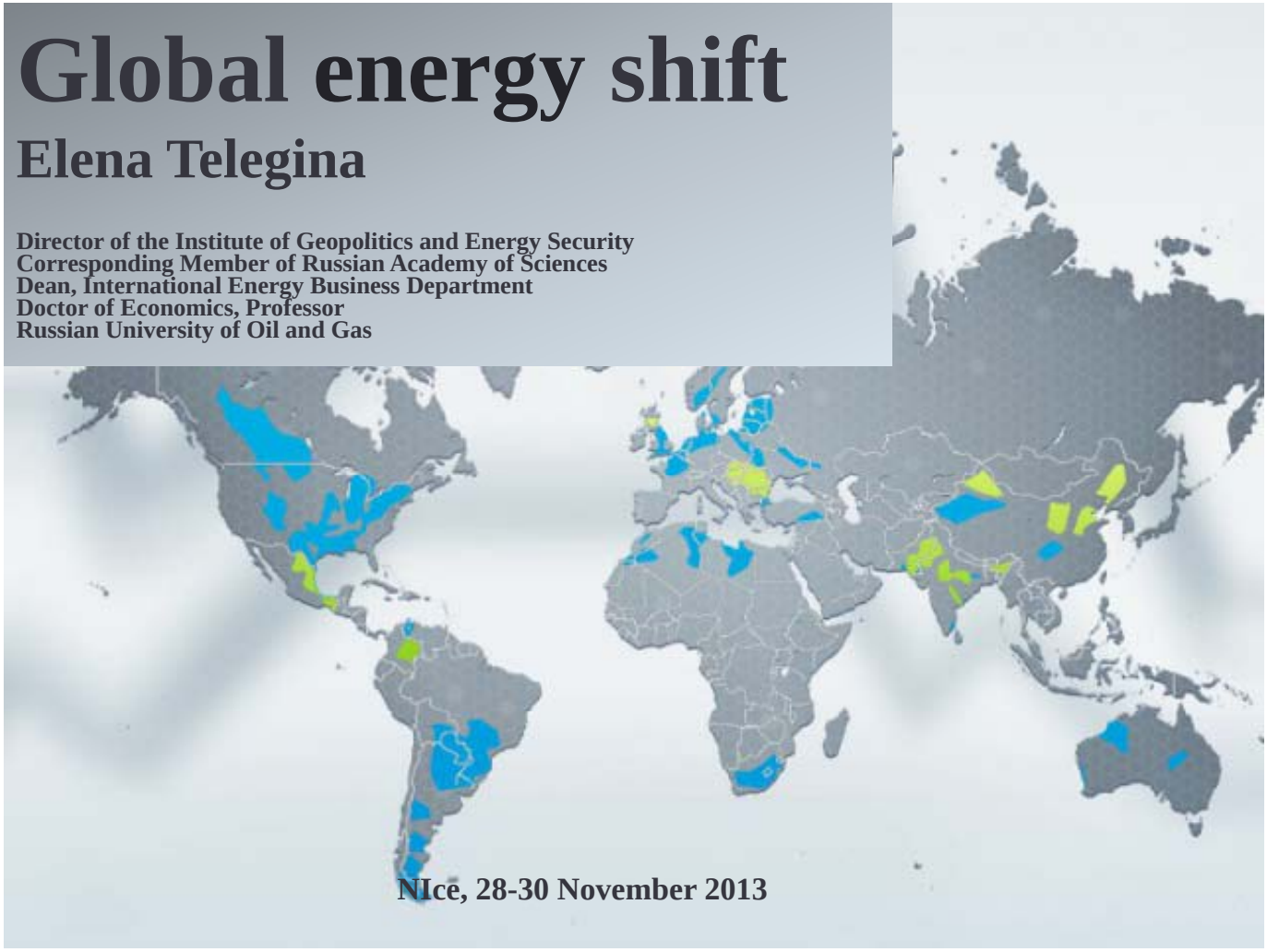
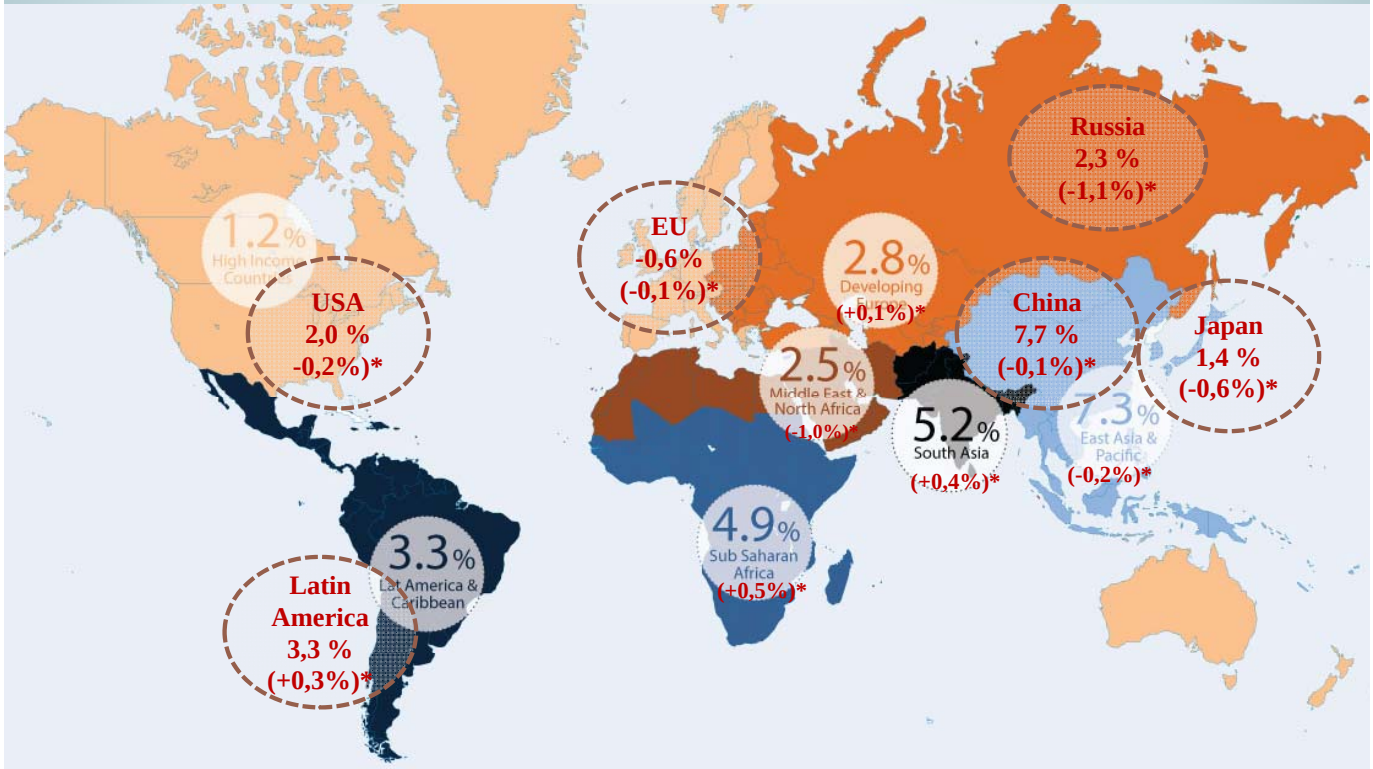


NIce, 28-30 November 2013

Regional GDP growth, World Bank 2013

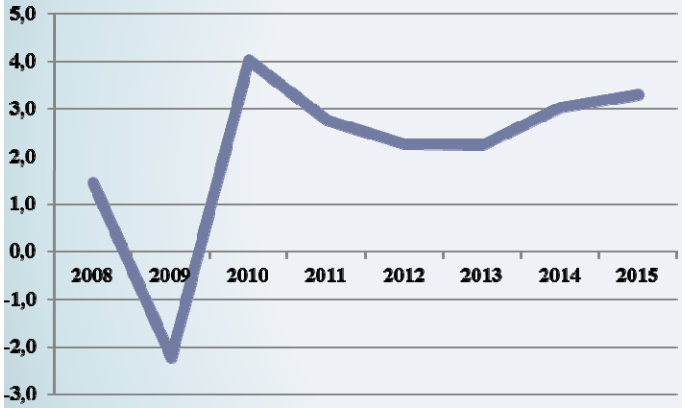


* % of change 2013 to 2012

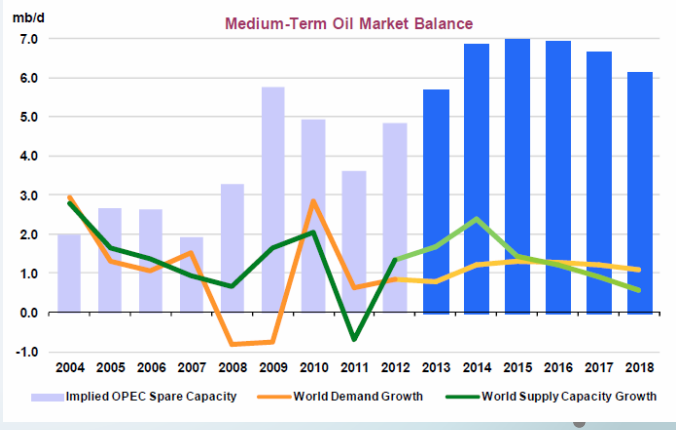
Gas slows down but still expands its role

- Global gas consumption grows at 100 bcm/year
- Gas is growing faster than oil at 2,4%/year but continues to fall behind coal
- Transportation emerges as a major demand accounting for 10% of gas demand growth driven by China and United States

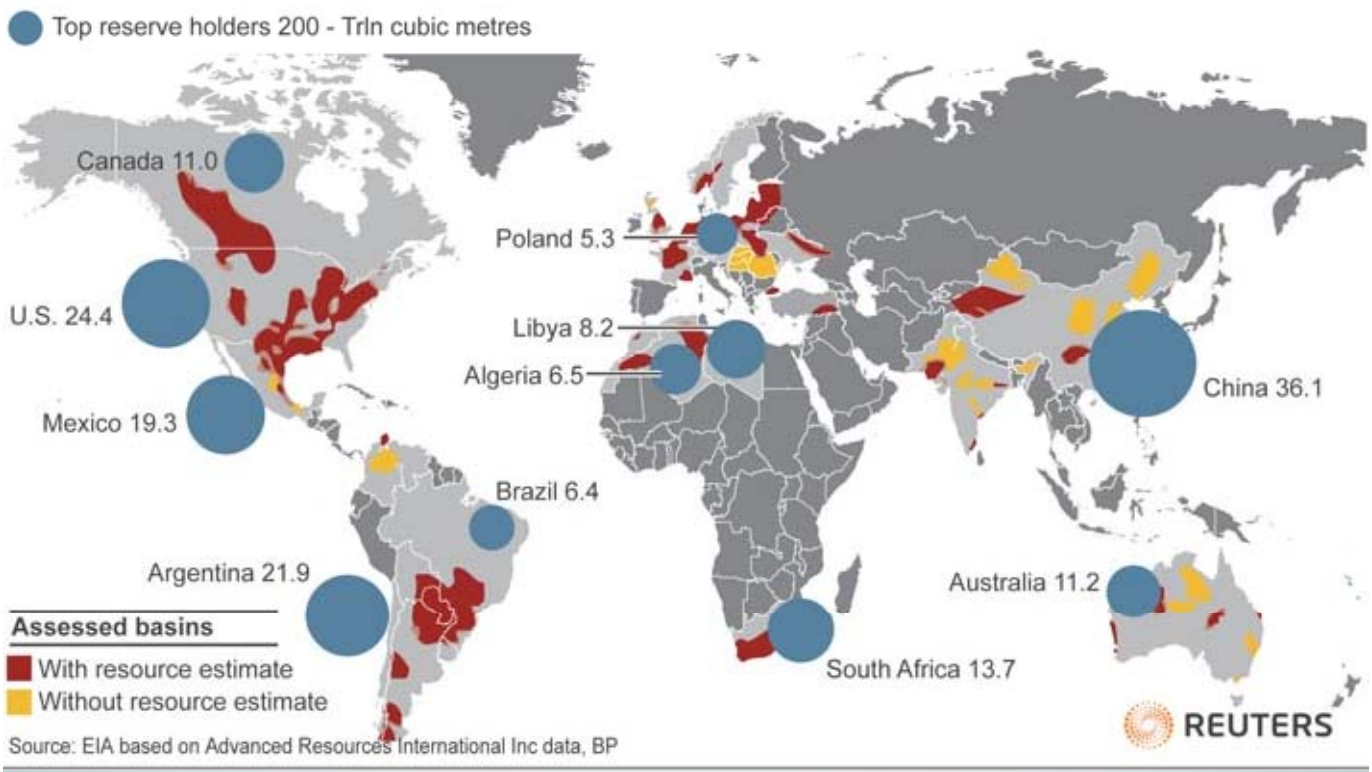
World GDP 2008-2015



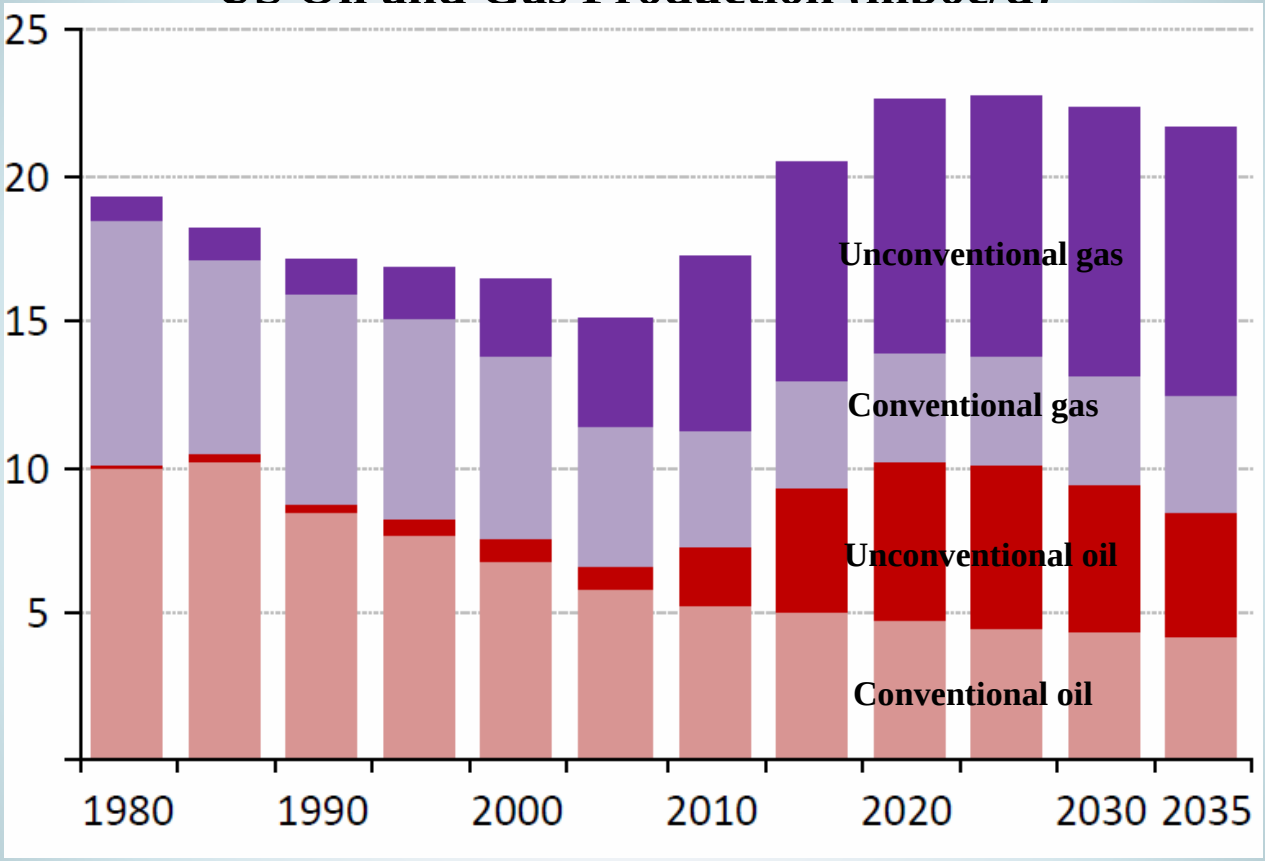
Medium-term Oil Market Balance



Global shale gas basins, top reserve holders

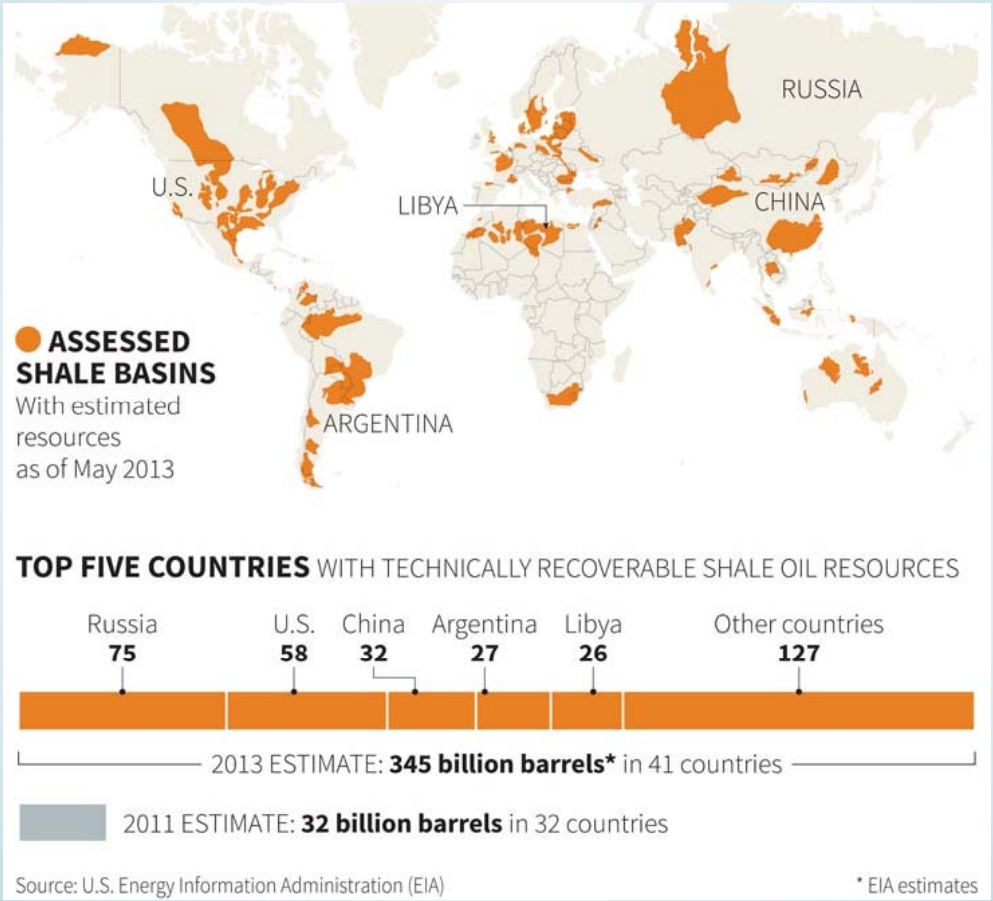


US Oil and Gas Production (mboe/d)



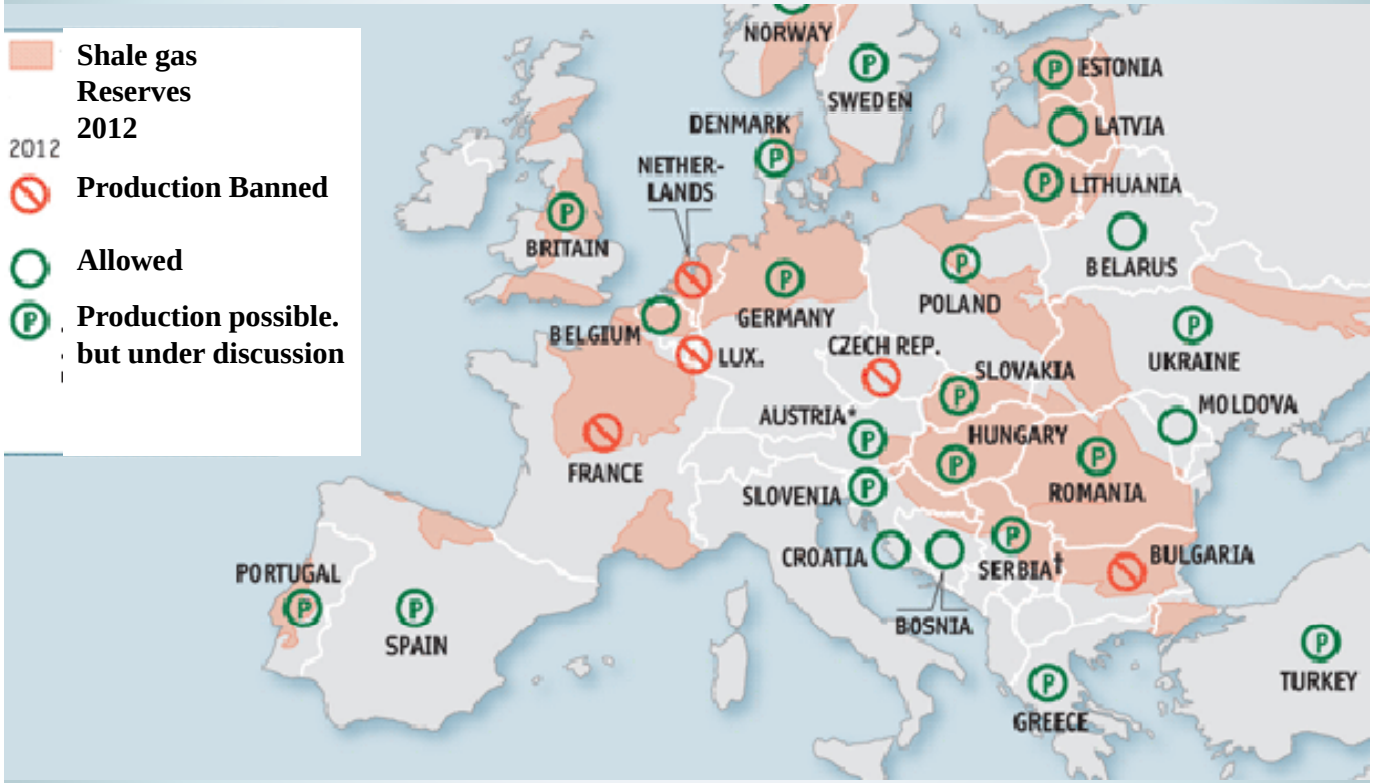
World Energy Outlook 2012, IEA, Paris 2012.

New shale oil estimates

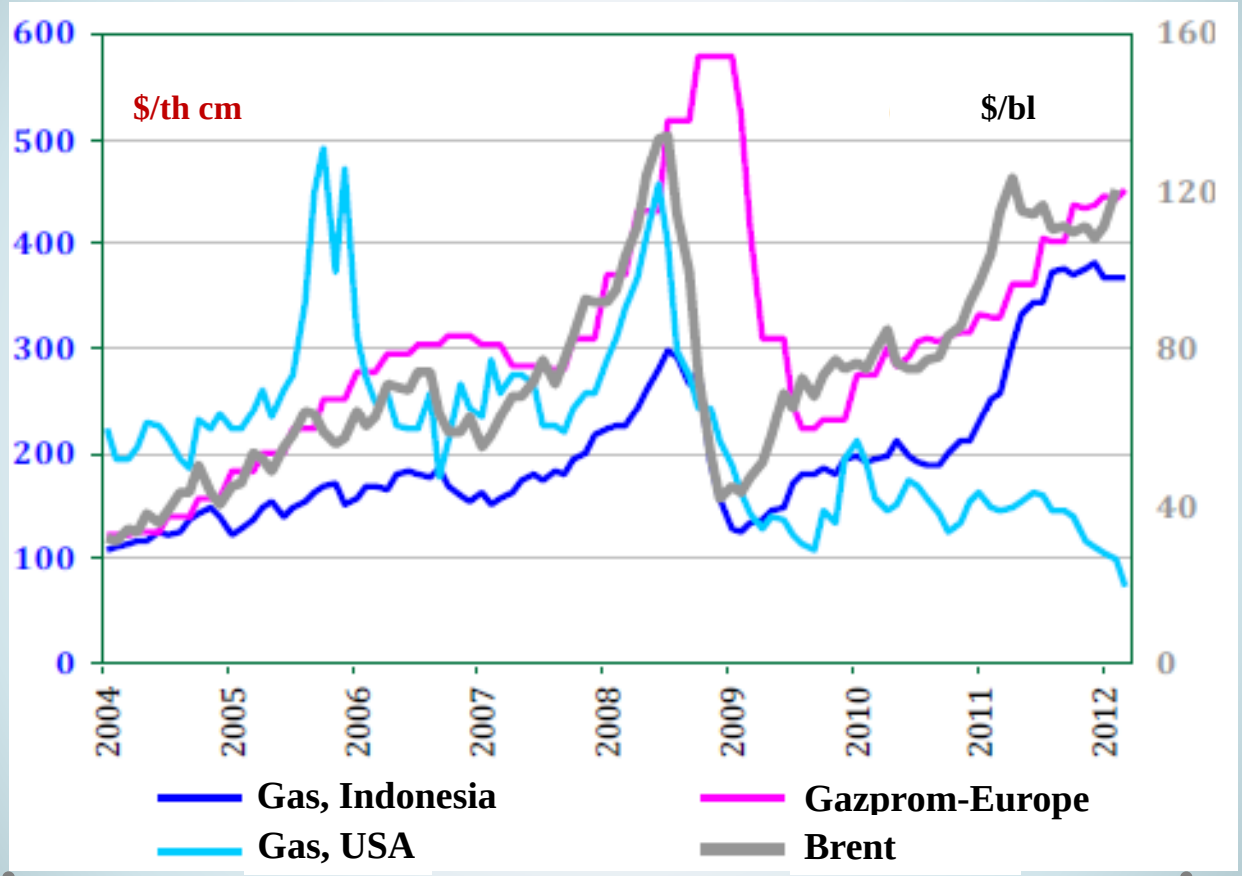


Shale gas basins in Europe

Shale gas reserves



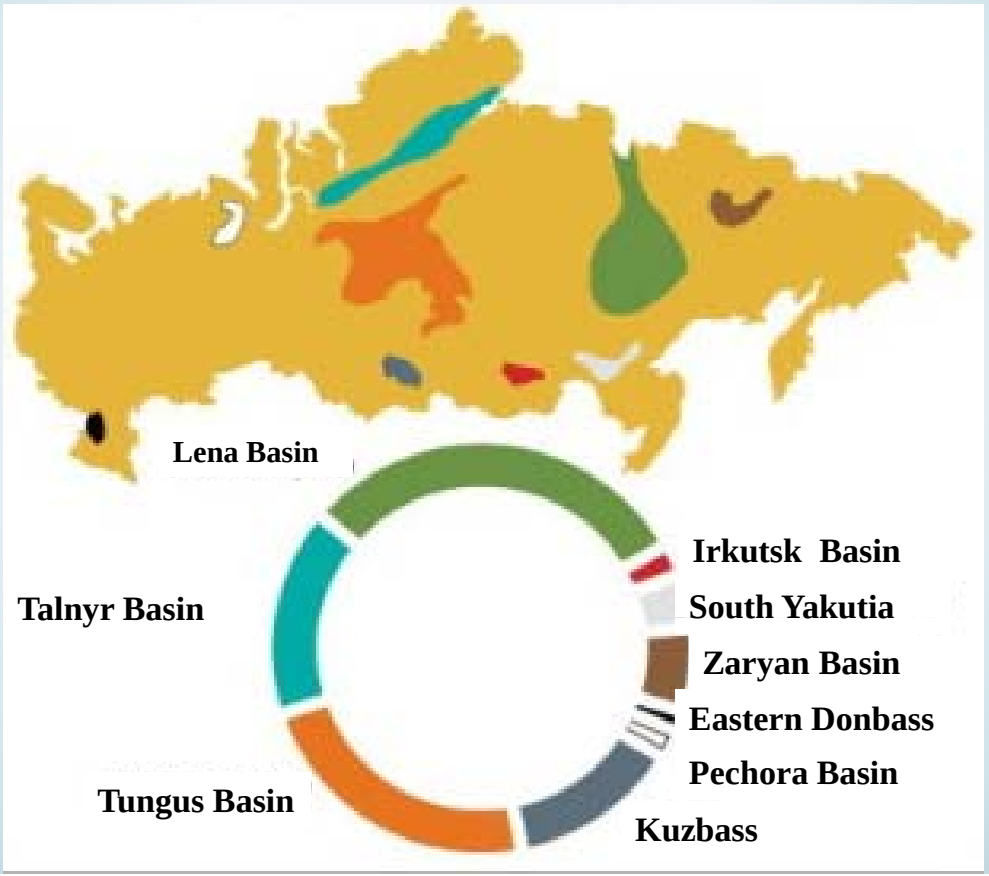
US gas prices decreasing

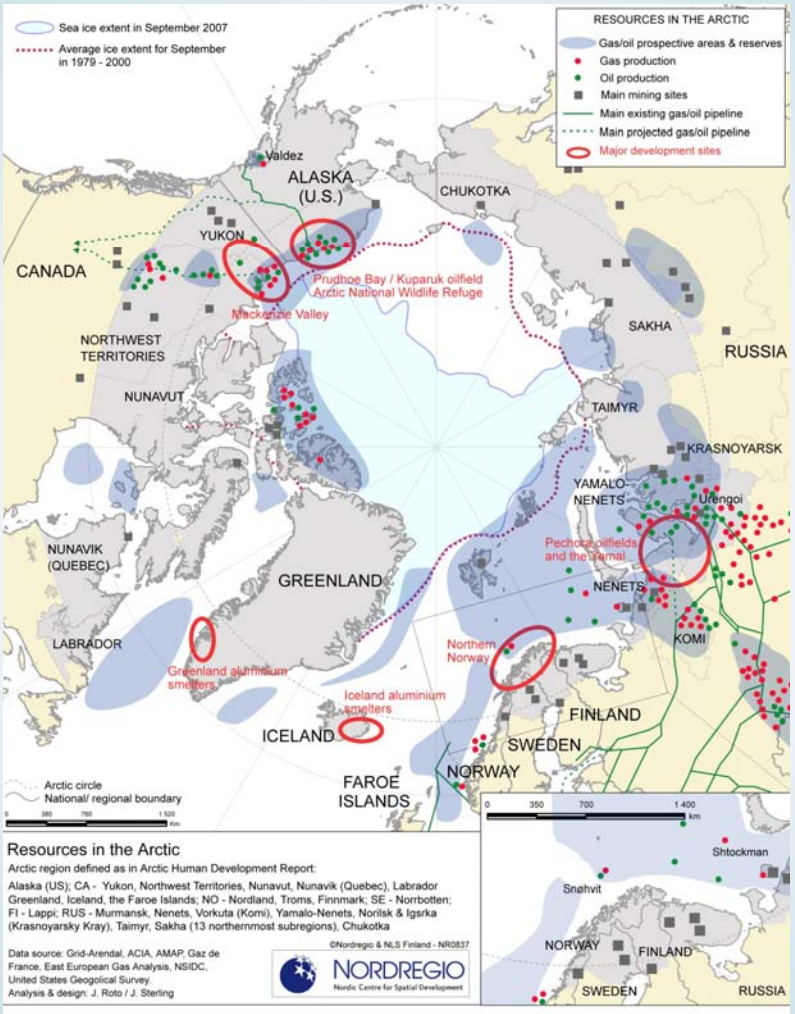


Finmarket.ru

Unconventional gas in Russia

83 700 tcm of CBM (coal bed methane)





Resources in the Arctic

Arctic region defined as in Arctic Human Development Report:

Alaska (US); CA - Yukon, Northwest Territories, Nunavut, Nunavik (Quebec), Labrador Greenland, Iceland, the Faroe Islands; NO - Nordland, Troms, Finnmark; SE - Norrbotten; FI - Lappi; RUS - Murmansk, Nenets, Vorkuta (Komi), Yamalo-Nenets, Norilsk & Igsrka (Krasnoyarsky Kray), Taimyr, Sakha (13 northernmost subregions), Chukotka

Data source: Grid-Arendal, ACIA, AMAP, Gaz de France, East European Gas Analysis, NSIDC, United States Geogolical Survey.
Analysis & design: J. Roto / J. Sterling

NORDREGIO
Nordic Centre for Spatial Development

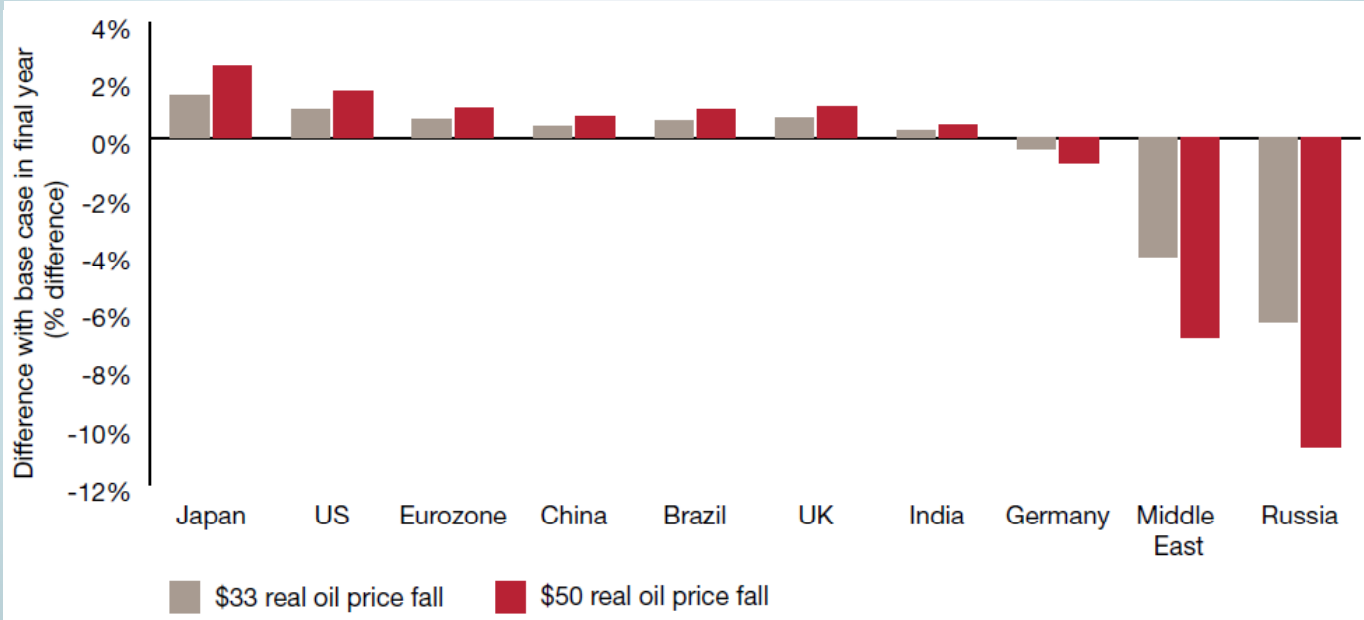
Energy Resources in the Arctic

30 % of the world's undiscovered natural gas and 13 % of the world's undiscovered oil in the Arctic (source: USGS)

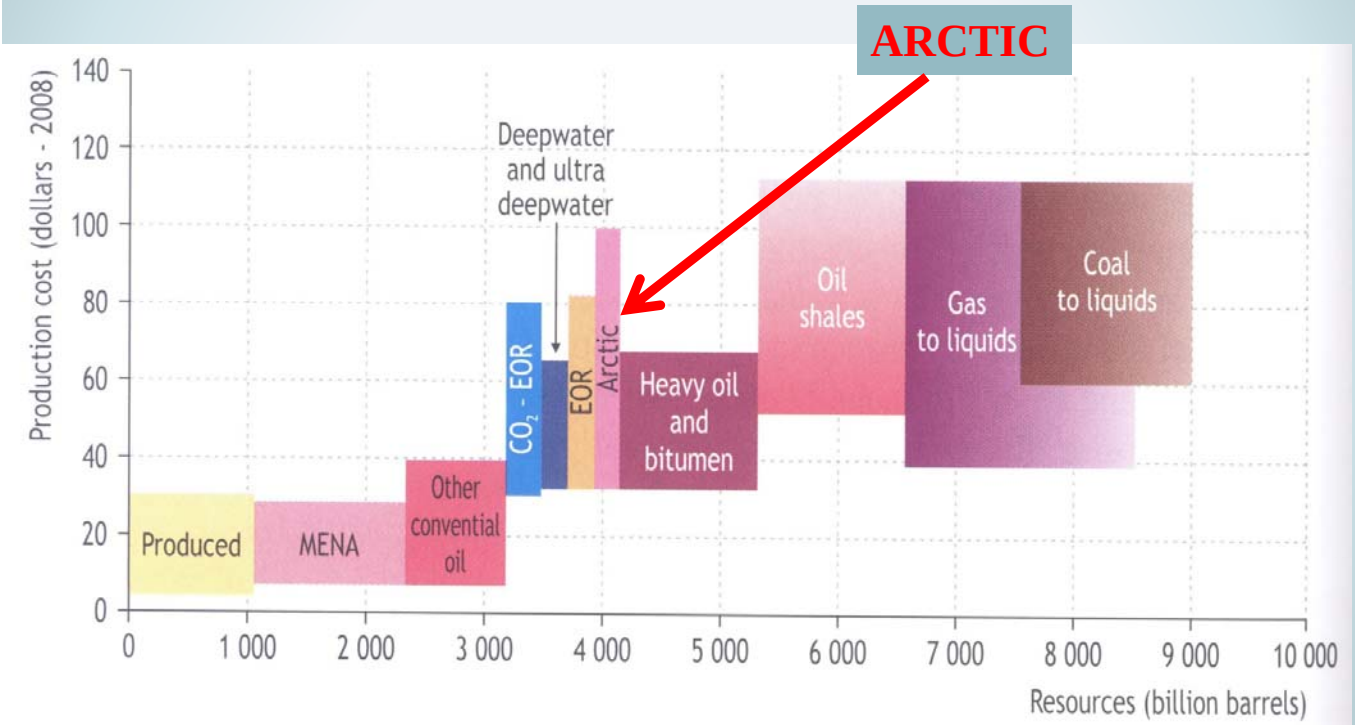
1. South Kara Sea
2. North Kara Sea
3. Laptev Sea
4. East Siberian Sea
5. Chukchi Sea
6. Alaska North Slope
7. East Greenland
8. Barents Sea

Change in current account balance

as % of GDP in alternative oil price scenarios



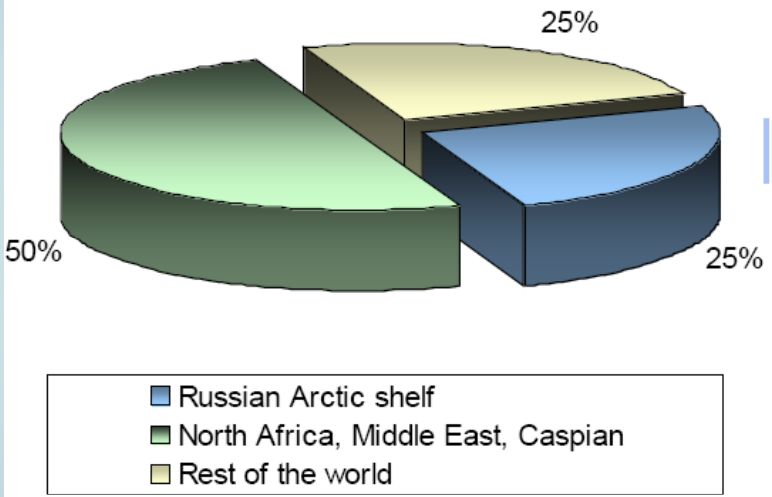
Oil supply curve



IEA – World Energy Outlook 2008

Russian Arctic Offshore

Distribution of the world HC resources

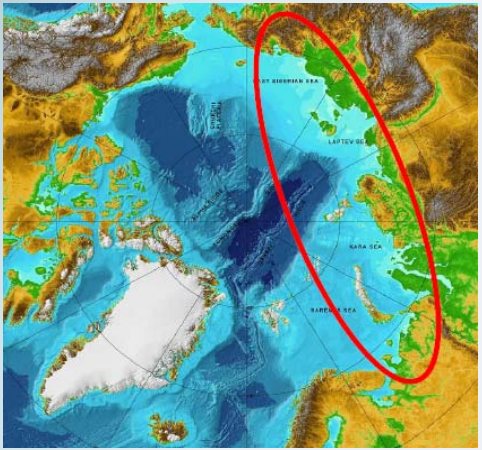


100×10^{12} м^3

(100 TCM)

Russian Ministry of Oil and Gas, 2007

New regions – challenges in project development



- **Severe climate conditions**
- **Presence of ice**
- **High cost**
- **Long distance export of oil and gas – additional heavy cost**
- **Lack of technology, competence and experience in offshore field development**
- **Deficit of qualified personnel**
- **Environmental risks, not yet fully understood**
- **Emergency response time**


Thank you!