





Chinese Shale Gas & Perspectives for Russian Gas Exports to China

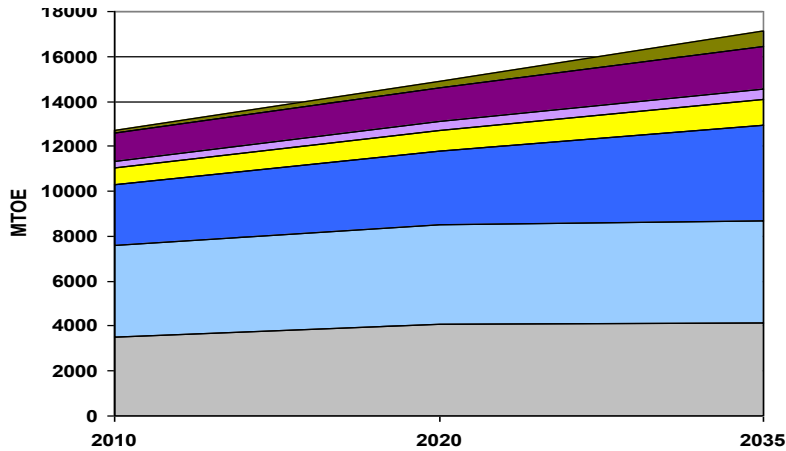
Olga Minina

China International Shale Gas Summit 2012

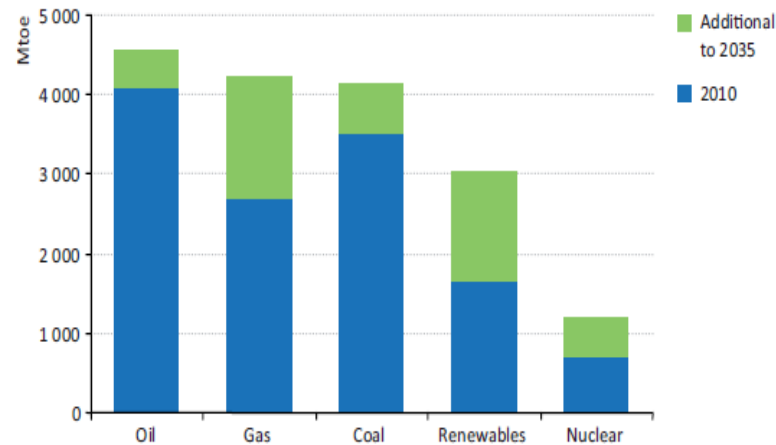
Nov 13-16th 2012

Chongqing, Crowne Plaza Chongqing Riverside

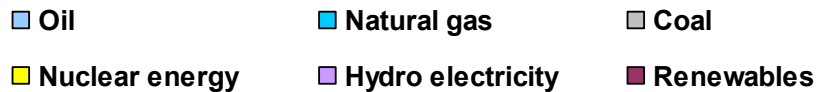
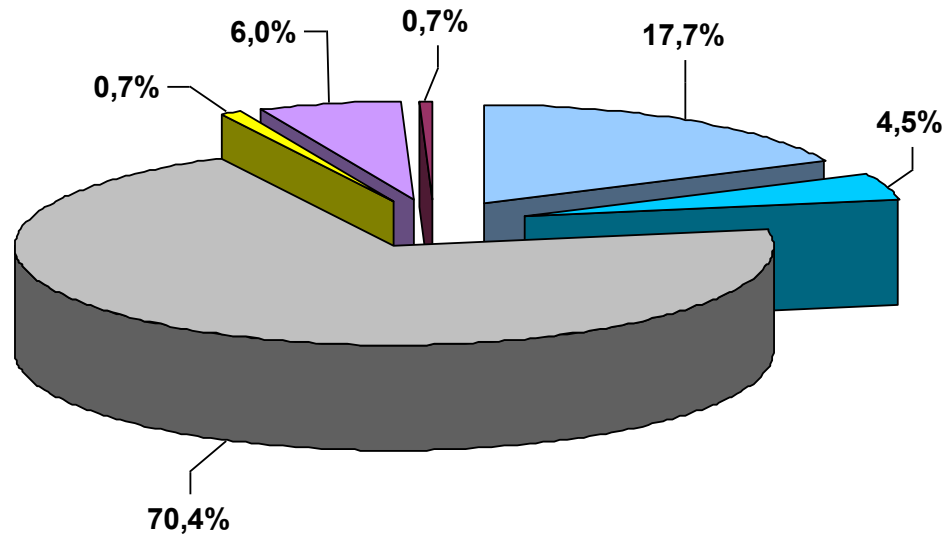
World primary energy demand and role of natural gas



- Global primary energy demand rises from around 12 700 million tonnes of oil equivalent (Mtoe) in 2010 to 17 150 Mtoe in 2035, an increase of 35%.
- Natural gas demand increases in the period to 2020 by more than 700 bcm (compared with 2010 levels), the equivalent of adding another United States to the global demand balance, and by a further 1.1 tcm in the period from 2020 to 2035, reaching a total of 5.1 tcm (4 230 Mtoe) in 2035.
- By 2035, natural gas has overtaken coal to become the second most important fuel in the energy mix.

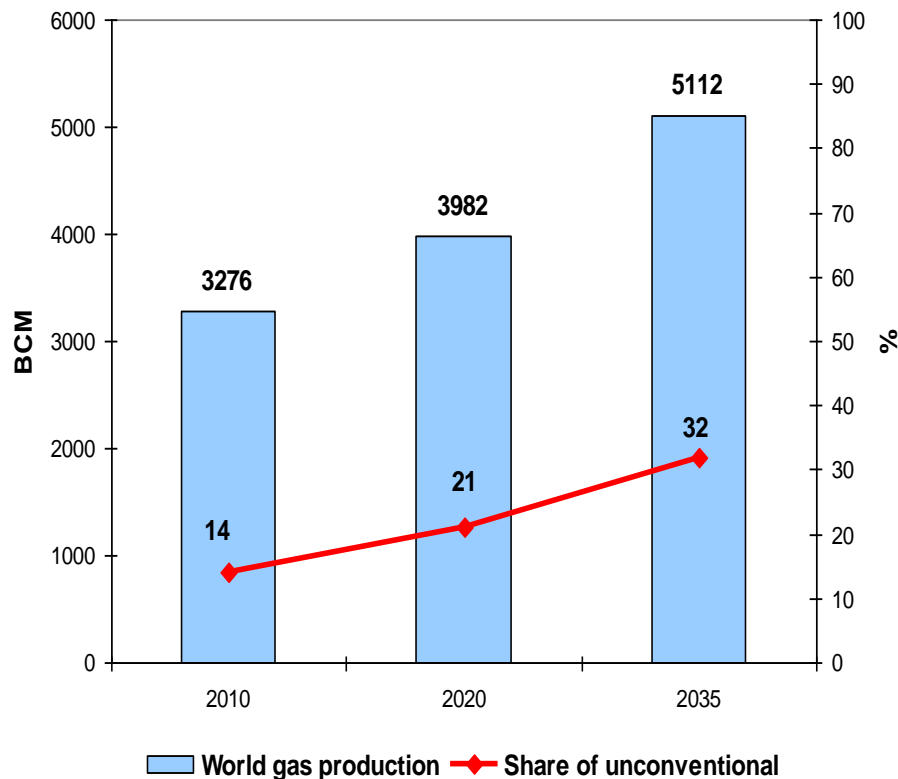


Chinese energy mix in 2011 and share of gas in 2015



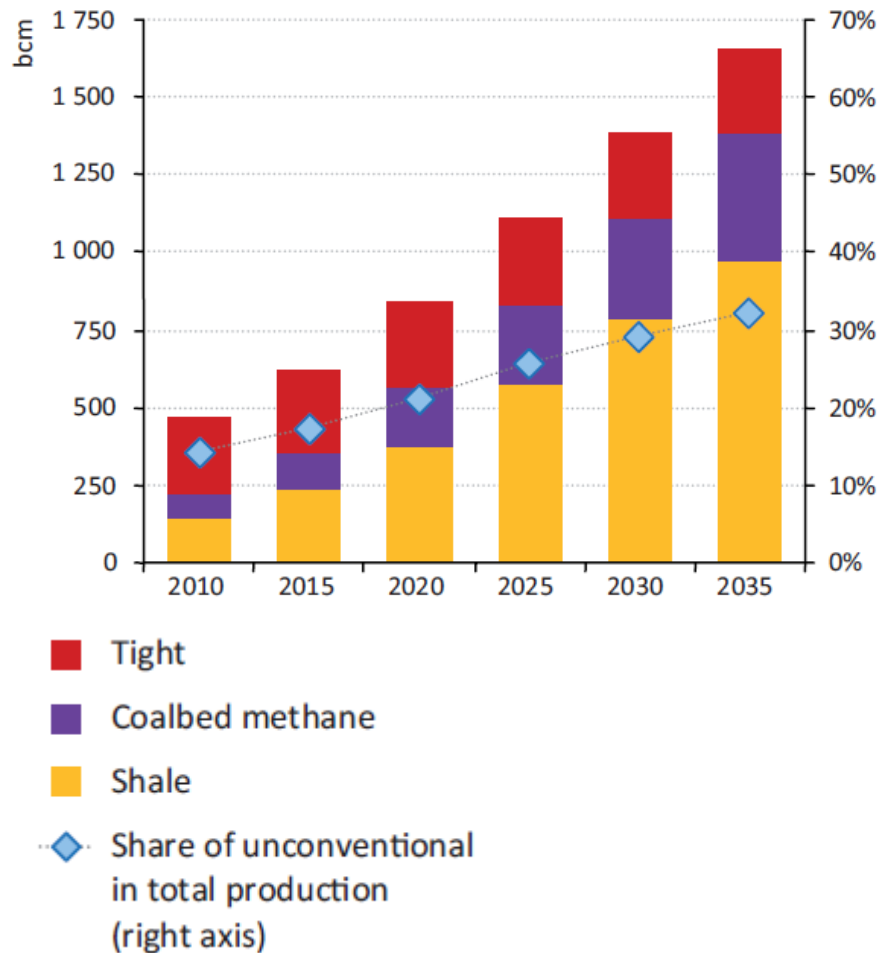
- Share of natural gas in the primary energy mix of China is 4.5% in 2011.
- Ambitious target is to double the share of gas (8%) in the primary energy mix of China by 2015.
- Natural gas is consistently substituting coal.

World gas production and share of unconventional



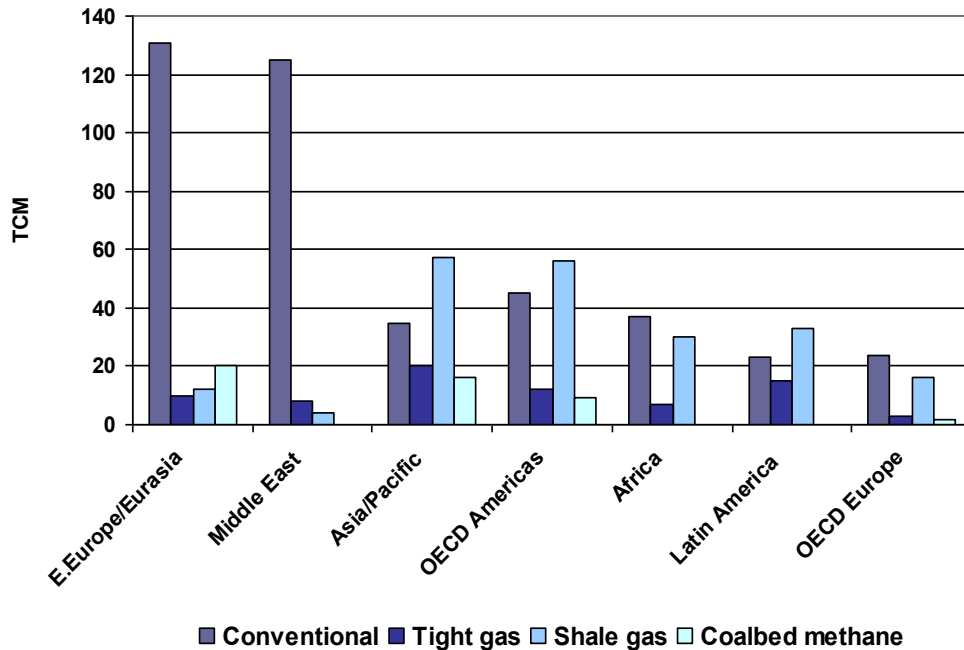
- In the Golden Rules Case, global gas production grows by around 55%, from 3.3 tcm in 2010 to 5.1 tcm in 2035. Over the same period, unconventional gas production increases from around 470 bcm in 2010 to more than 1.6 tcm in 2035.
- Although unconventional gas output grows relatively slowly in the early part of the projection period, reflecting the time required for new producing countries to develop commercial production, for the projection period as a whole, unconventional gas represents nearly two-thirds of incremental gas supply.
- The share of unconventional gas in total gas production increases from 14% in 2010 to 32% in 2035.

World unconventional natural gas production



- Of the different sources of unconventional supply, tight gas, at 245 bcm, accounted for just over half of global unconventional production in 2010. However, it is rapidly overtaken in projections by production of shale gas, which rises from around 145 bcm in 2010 (31% of total unconventional output) to 975 bcm in 2035 (almost 60% of the total).
- Production of coalbed methane likewise grows rapidly, from 80 bcm in 2010 to nearly 410 bcm in 2035.

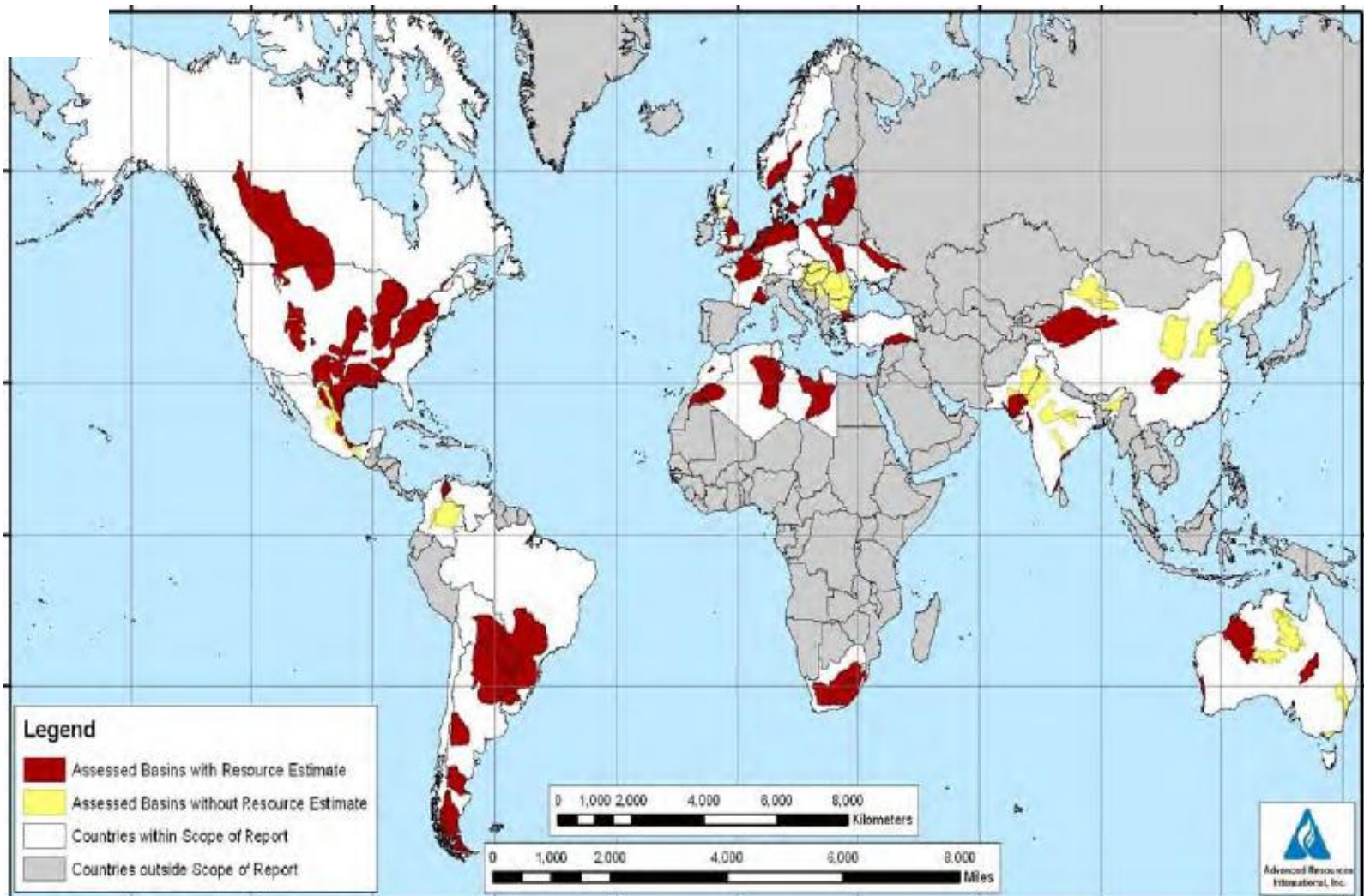
Remaining technical recoverable natural gas resources by type and region, end-2011



- Remaining technically recoverable resources of shale gas amount to 208 tcm, tight gas - 76 tcm and coalbed methane 47 tcm.
- Russia and countries in the Middle East are the largest holders of conventional gas resources (and Russia has by a distance the largest overall gas resources).

- A large part of the world's recoverable unconventional gas lies in countries or regions that are currently net gas importers and face increasing import dependency, such as China, and the United States, which before the recent boom in unconventional gas in North America was looking at the prospect of rising LNG imports.

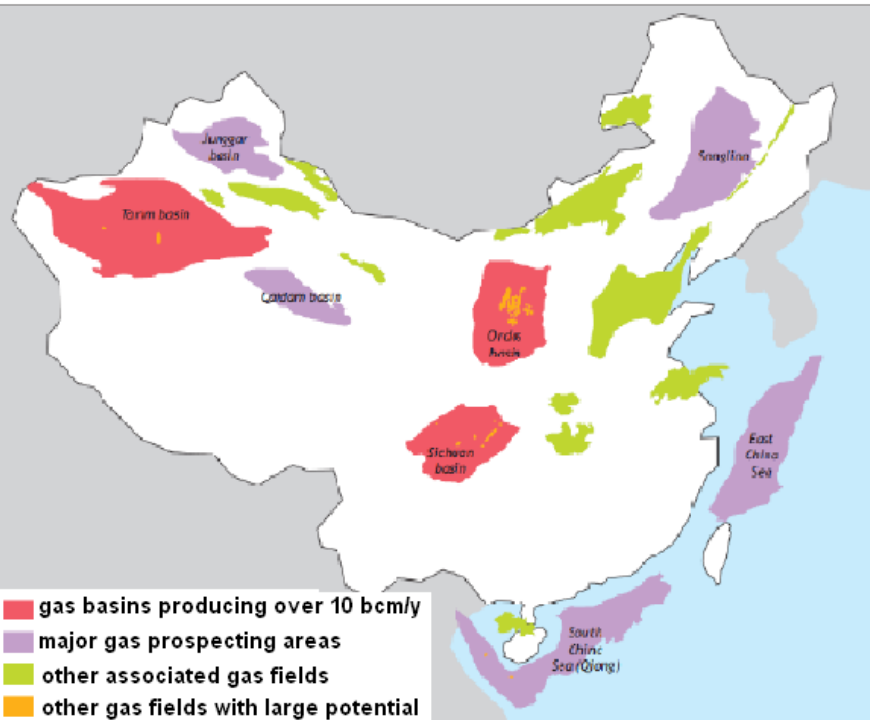
Map of 48 major shale basins in 32 countries



Source: EIA, World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States

Gas resources in China

- China's potential gas resources exceed 91 tcm of natural gas of which 38.8 tcm lie onshore and the rest (52.6 tcm) – offshore. [C1 China Gas Market Monthly, #7, October 10, 2006]
- China's remaining recoverable resources of unconventional gas totalled almost 50 tcm, comprised of 36 tcm of shale gas, 9 tcm of coalbed methane and 3 tcm of tight gas. [EIA, WEO 2012]
- According to data from the Ministry of Land and Resources, at the end of 2011, China had 12 tcm and 25 tcm respectively of remaining recoverable resources of tight gas and shale gas which are still in the early stage of development.

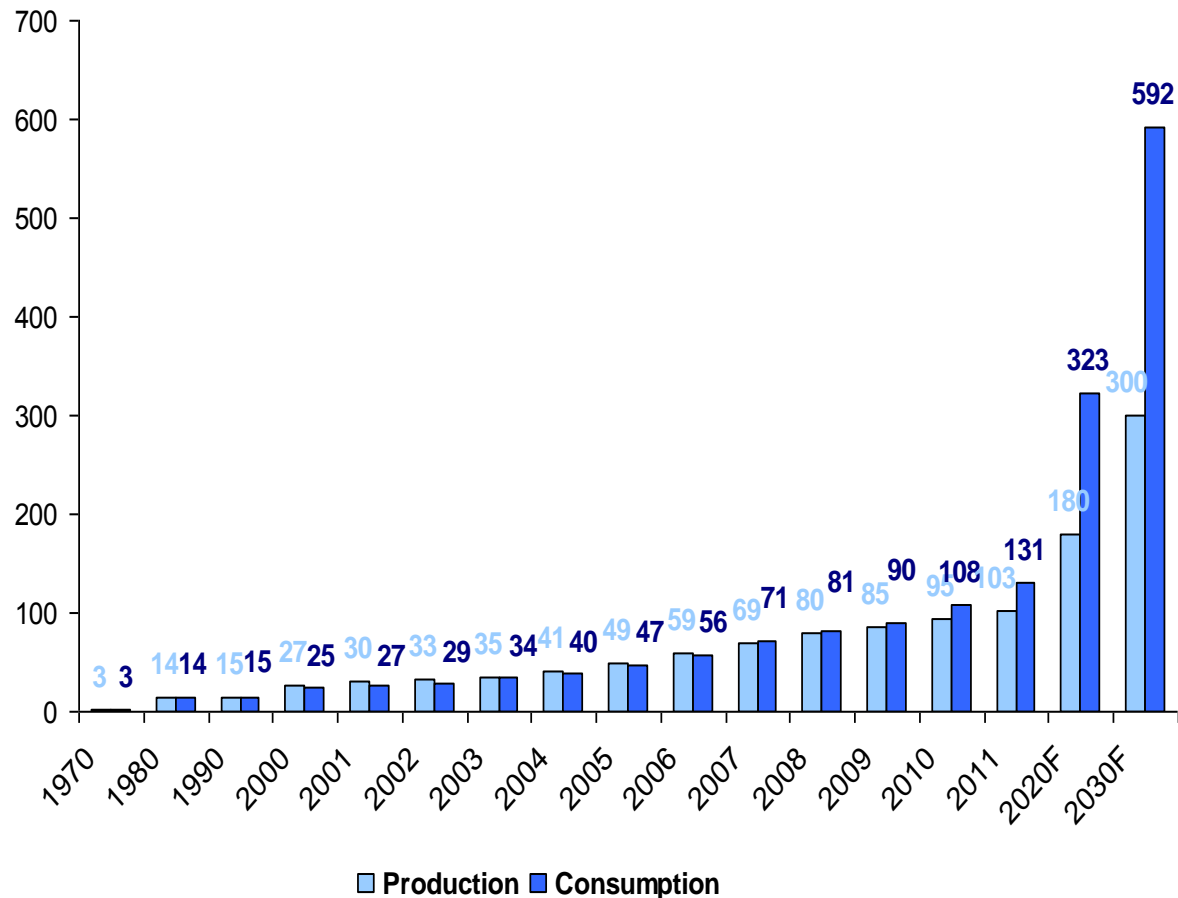




Challenges for the future of shale gas in China

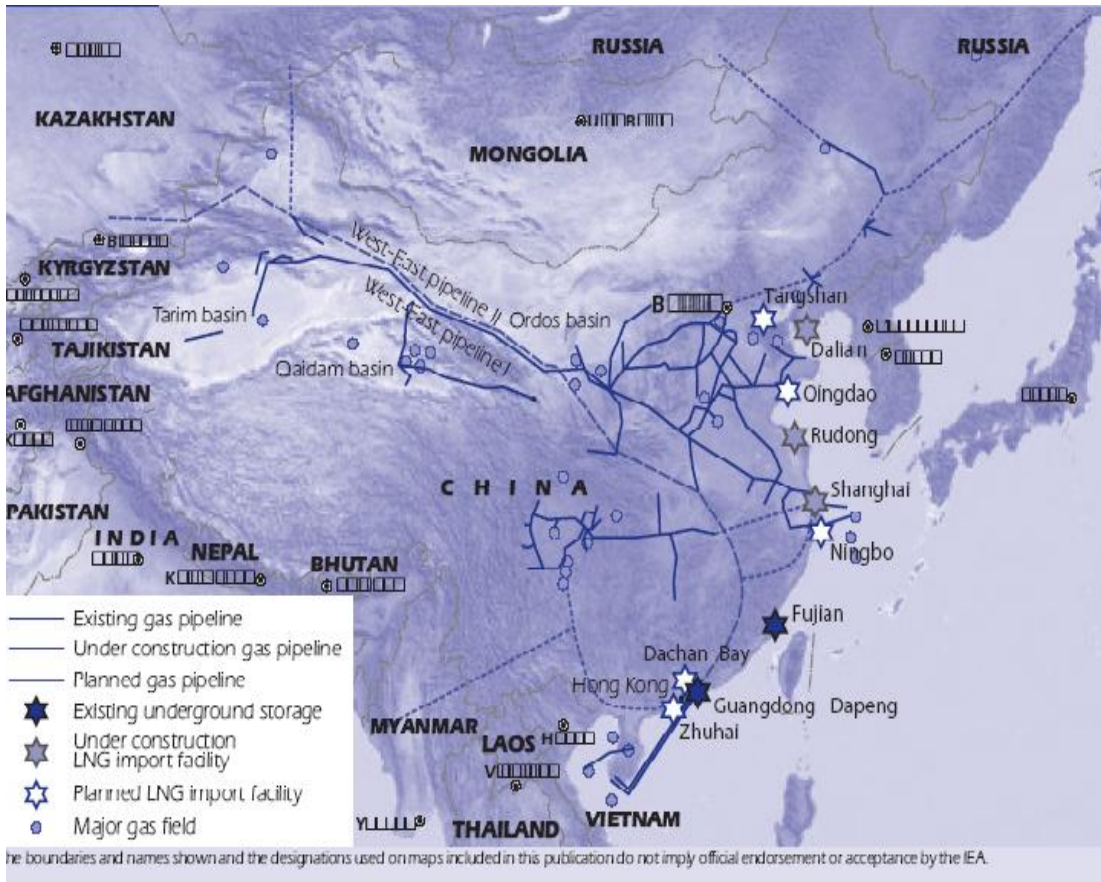
- ***No proved reserves.*** Resource evaluation data might be obtained only through drilling, and there are just a handful of shale wells drilled.
- ***Geology.*** Geological conditions in even the most promising Chinese basin, Sichuan, still are less favorable than of those in the USA.
- ***Technology.*** There are no relevant technologies of production, logistics, and specialized service contractors.
- ***Gas infrastructure.*** Chinese gas infrastructure is under development.
- ***Shale gas is a risky business*** which is not typical for large state owned companies
- **High production costs, market monopolization and coal industry lobby may impact on the future of shale gas in the country.**

China's domestic gas production and consumption in 1970-2030, bcm



- China's natural gas production is expected to be 110 bcm in 2012, increase to 180 bcm in 2020 and 300 bcm in 2030 according to Chinese Ministry of Land and Resources.
- IEA forecasts Chinese gas consumption at the level of 323 bcm in 2020 and 592 bcm in 2030.

Chinese gas infrastructure under development and capacities of import facilities



Current capacities

**Turkmenistan-China pipeline – 40 bcm,
LNG terminals – 19 mln t/26 bcm**

Capacities under development

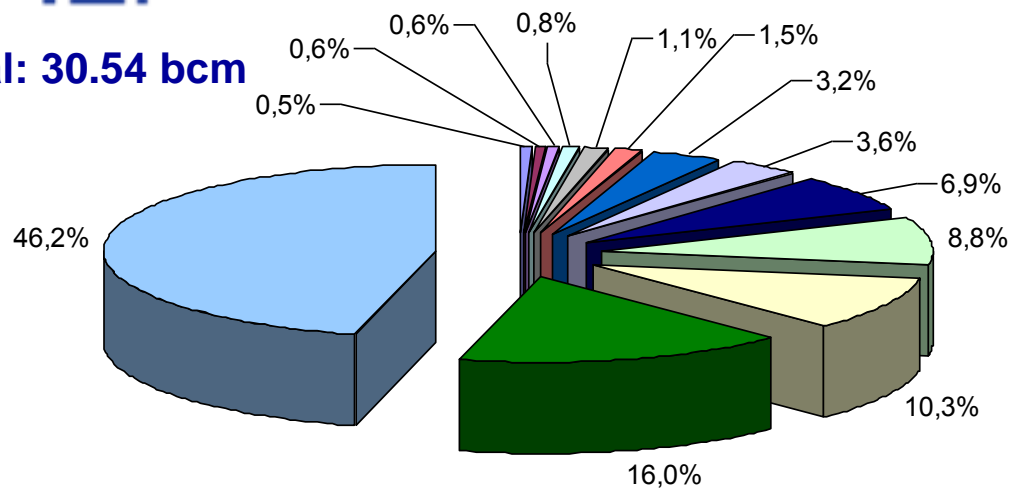
**Myanmar-China pipeline – 12 bcm,
LNG terminals – 27 mln t/37 bcm**

Proposed capacities

**Turkmenistan-China pipeline – 65 bcm,
Altai pipeline – 30 bcm,
LNG terminals – 45 mln t/62 bcm**

Structure of Chinese gas import in 2011

Total: 30.54 bcm

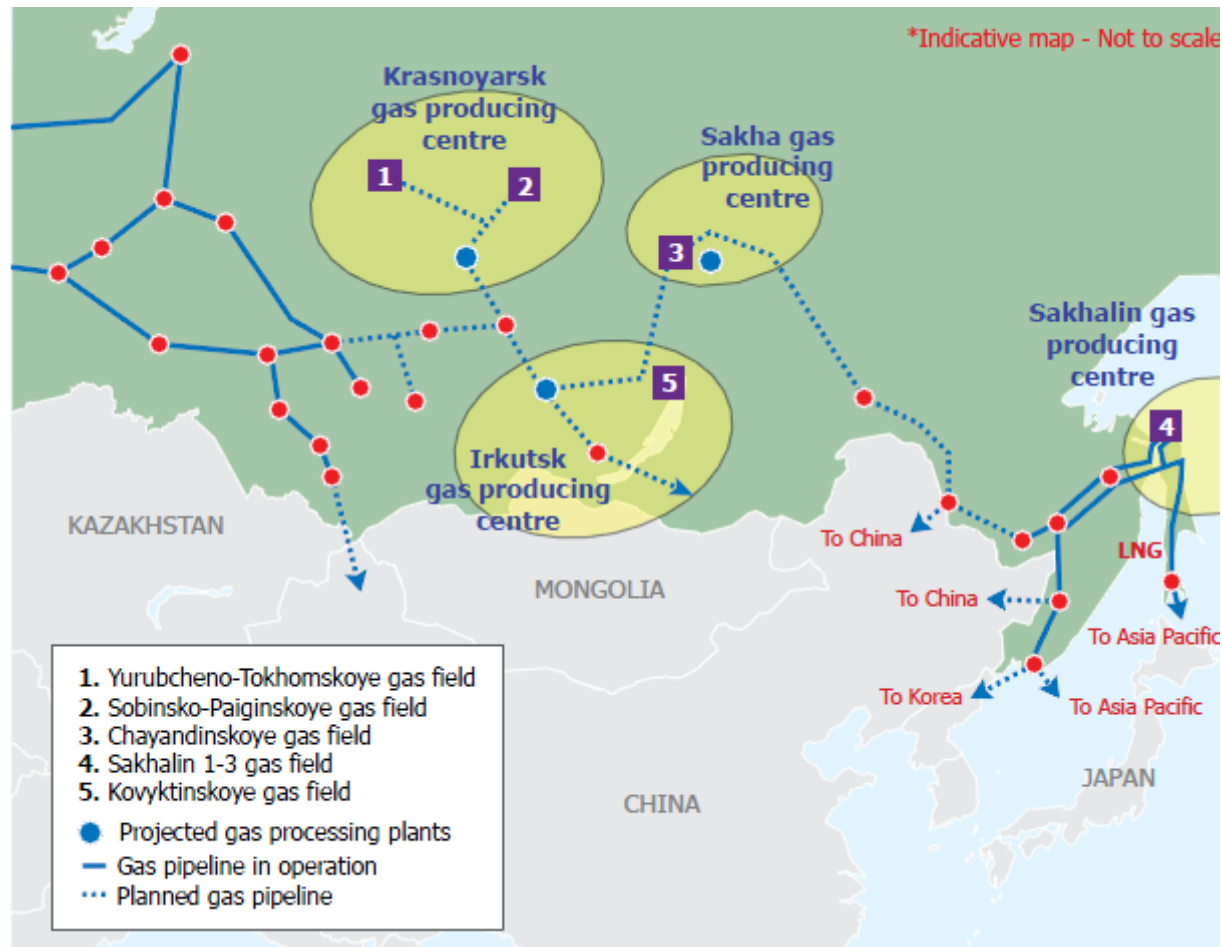


- Peru LNG
- Equatorial Guinea LNG
- U.S. LNG *
- Egypt LNG
- Russian Federation LNG
- Trinidad & Tobago LNG
- Nigeria LNG
- Yemen LNG
- Malaysia LNG
- Indonesia LNG
- Qatar LNG
- Australia LNG
- Turkmenistan pipeline

- The share of LNG imports is 54%, gas imports by pipeline is 46%.
- Turkmenistan became the most important importer of gas to China.

* Includes re-exports

Eastern Siberia and Far East gas producing centers in Russia

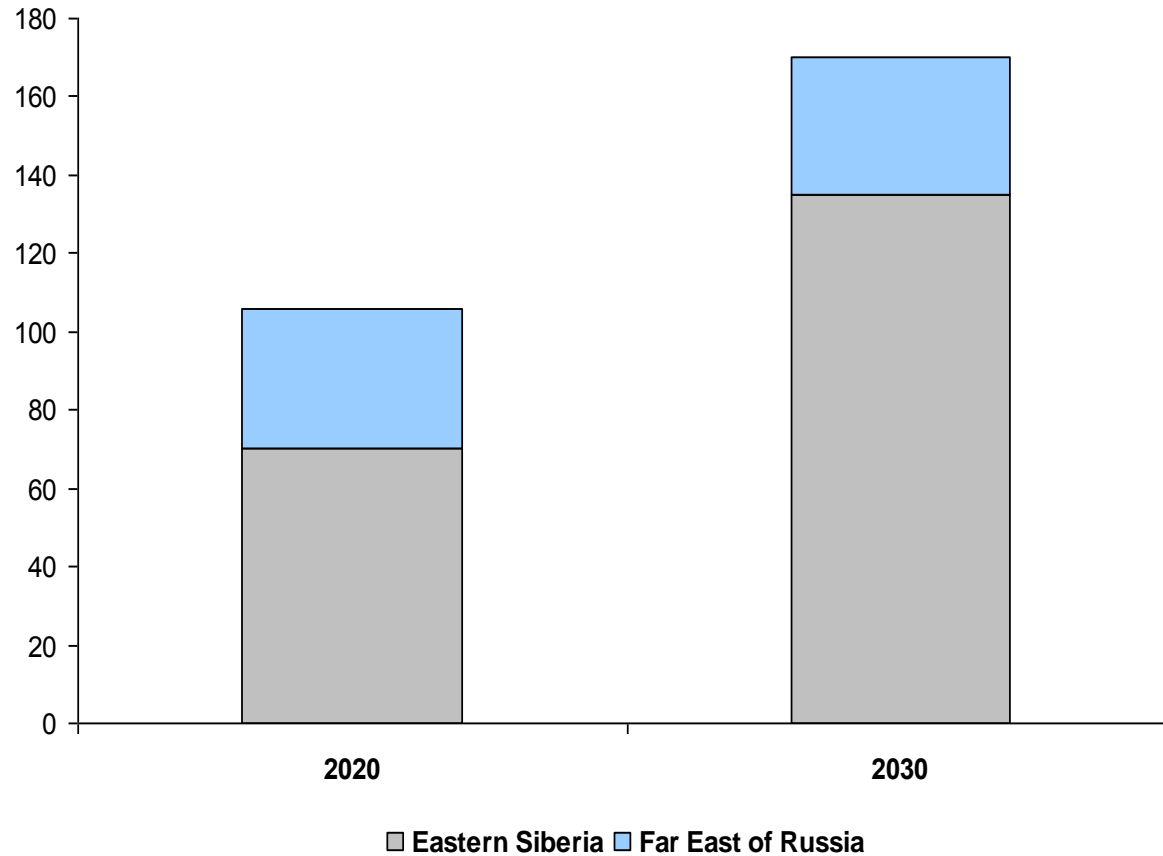


Current gas reserves ABC1+C2:

- Krasnoyarsk – 1.3 tcm
- Sakha – 2.2 tcm
- Irkutsk – 3.4 tcm
- Sakhalin – 2.4 tcm

Future gas production in Eastern Siberia and Far East of Russia, bcm/y

- **Gas production in Eastern Siberia and Far East of Russia may exceed 100 bcm in 2020 and 170 bcm in 2030.**



Russia – China gas story

- **As per Protocol on the Russian natural gas supply to the China Peoples' Republic of 21 March 2006, gas flows should have reach the Republic by 2011, at volumes in the range 60 - 80 bcm/y.**
- **Recent bilateral agreements of 2011 presume Russian gas supplies to China to reach 68 bcm/y – with two gas routes to come into effect – the Eastern route and the Western route.**
- **Due to the gas price of the deal unsettled over the course of many-year disputes this project is pending.**

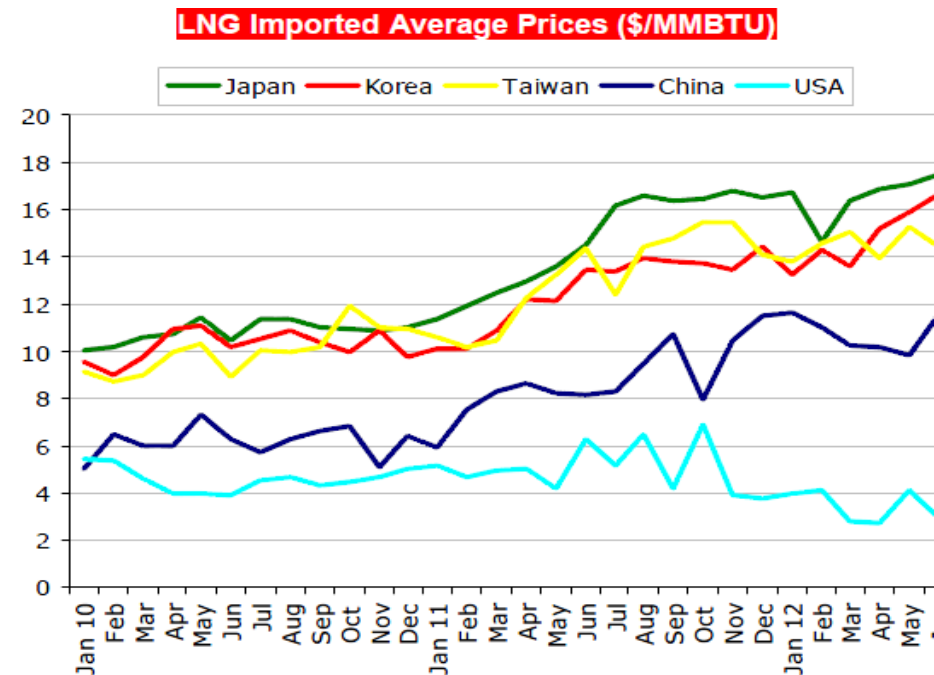
Gas pricing in China

- Pipeline gas is priced on cost-plus basis. Prices for producers are set at level 3-6 USD/MBTU.
- LNG import prices are at an international level which have a tendency to grow from 3-4 USD/MBTU to 7-18 USD/MBTU.

Shanghai gas prices (est.), end 2011, \$/MMBtu

Turkmen border price (assuming oil price of \$100/bbl)	9.10
WEP II transmission tariff	4.20
Shanghai city gate (Turkmen gas)	13.30
Shanghai city gate (Chinese gas)	9.80
Shanghai city gate (LNG from Malaysia)	7.50
Loss borne by CNPC on sales of Turkmen gas	3.50

Source: Oxford Institute for Energy Studies (with Michael Chen); Note: City gate prices are regulated by government



Conclusions

- **Potential of the China shale gas industry is depending on the successful resolution of the challenges it faces.**
- **In any case it will take time, shale gas production will grow far away from main consumers and it will be costly.**
- **Competition on the China gas market becomes more and more visible.**
- **Gas price reform in China regions has only started and its pace and scale are yet uncertain.**
- **The first targets for imported gas in the developed East of China should be “premium” consumers in cities**
- **Regarding Russian gas imports: the positive signals are successful development of oil import infrastructure and increasing interest to resolve gas issue on both sides.**



Thank you for your time!