

China-Russia energy pact and China's energy dynamics

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Recent deals with Russia and their implications

A number of observations are in order.

First, these deals are financially bad for Russia and good for China. The supply for the first deal in May 2014 is to come from undeveloped gas fields in Eastern Siberia, which require necessary infrastructure to be built. The Crimea crisis gave China the leverage in having preferential prices agreed. Under the second deal at the margins of the APEC Summit, gas is to come from Russia's mature fields in Western Siberia supplying Europe. Prices have not yet been fully agreed but are likely to be even more advantageous to China as gas prices have plummeted and the Russian ruble is tumbling due to Western sanctions.

Second, Russia is unlikely to lift its energy stranglehold over a good part of Europe any time soon. The May deal is for 38 bcm (billion cubic metres) of annual supply from 2018 onwards. The second deal is for 30 bcm. The two deals add up to 68 bcm, a far cry from the 160 bcm Russia is supplying to meet a quarter of Europe's needs. Europe's anxious desire for alternative supplies cannot be fulfilled by a magic wand. Leaving aside environmental concerns, the best case scenario for Europe's shale gas production is 10 bcm by 2020 and 80 bcm by 2030. US gas export to Europe (likely from Louisiana LNG) is expected to start in 2015 but huge export infrastructure on both sides of the pond will take time to realize. So the prognosis is that at best, Europe may only be able to half Russian supply within a decade.

Third, the two deals do not signal China's energy dependence on Russia. They only add up to 17% of China's total gas needs by 2020.

During this period, gas merely represents 10% of China's energy mix. Even when gas and renewables are expected to grow in proportion, coal still remains dominant for China perhaps until 2050. Overall, the two Russian gas deals would equate to only 1.7% of China's total energy mix.

Fourth, the gas deals do not mean that Russia and China are forming an Eastern bloc against the West. Yes, there is Putin's pivot to the East and China's to the West. There is Russia-China coordination in the UN Security Council. There is a common desire to grow the influence of the BRICS countries to balance against U.S. dominance. But the world has now become so inter-connected and inter-dependent that any ideas of rigid blocs no longer work. What is more, Russia and China are by no means all-weather friends. Putin is anxious that Russia's sparsely-populated east is exposed to the risks of Chinese settlements and trade. The history of Tsarist seizures of these huge territories from the Middle Kingdom still remains vivid in the minds of both Putin and his Chinese counterpart.

China's energy dynamics in response to Climate Change

China has long been alive to threats to regime stability posed by resource scarcity, pollution, and geopolitical choke points to vital energy supplies. This informs China's proactive development of overland pipeline linkages through Central and West Asia as well as expanding energy footprints across the globe, including Africa and Latin America. It also partly explains China's more assertive stance in the East and South China Seas.

However, over-dependence on energy input calls into question economic and social sustainability. In particular, overcoming the "middle-income trap" mandates a more balanced and higher-quality development model. Hence reduction of energy intensity has repeatedly been highlighted in recent five-year plans.

Growing global concern with Climate Change has driven together China and the U.S., the world's two largest polluters, in a groundbreaking accord at the APEC Summit in Beijing. For the first time, China has undertaken to cap carbon emissions by 2030, if not sooner.

China's confidence in meeting this target appears to be based on reasonably solid grounds.

According to a report by the PEW Charitable Trust (1), China became the global leader in **wind energy** in 2013, with investment accounting for 38% of the global total. China announced in May that over 100 GW of wind energy capacity will be installed to power some 100 million households by 2020. With current wind energy cost at 0.4 RMB (US\$0.059) per kilowatt-hour, wind energy could displace 23 % of China's coal-generated electricity, equivalent to 0.62 gigatonnes (9.4%) of annual CO₂ emissions (2).

In 2013, China became the world's largest investor in **solar energy** with projects worth \$22.6 billion, tripling the size in 2012, with the aim of reaching a capacity of 35 GW by 2015 and 50 GW by 2020. According to the Worldwatch Institute, Washington D.C., China has 30 million solar households and 60% of world's installed capacity.

Capacity for **hydro-electric power** under the five-year plan 2011-2015 is to increase from 220 GW to 290 GW. By end 2013, capacity had already reached 280 GW, equivalent to 22% of the nation's total power capacity, up 12.3% from 2012.

As for **nuclear energy**, in addition to 21 existing reactors, 28 more are under construction with 2 new plants to be added annually for the next 15 years. New reactors planned include the world's most advanced. Capacity is expected to increase ten-fold to 80 GW by 2020, 200 GW by 2030, and 400 GW by 2050.

The National Development Reform Commission plans renewable energy to account for 20% of electricity generation by 2020.

According to a 2010 roadmap of the Chinese Academy of Sciences, fossil energy is to decrease from 92.7% of total supply in 2007 to 66% by 2030 and 45% by 2050. New and renewable energies are to grow from 9% in 2012 to 27% by 2030 and 45% by 2050. The remainder, nuclear energy, is expected to increase from 1.8% in 2003 to 7% by 2030 and 10% by 2050.

Renewable energies aside, gas is respectively 43% and 30% less in CO₂ emissions compared with coal and oil, which together represent some 90% of China's total energy use. As 55.2% of China's oil is imported, for environmental and national security reasons, gas holds a great deal of promise for China.

According a Medium Term Gas Market Report of the International Energy Agency (IEA), China is embracing the global "*Golden Age of Gas*", likely to represent half the increase in world demand for the rest of the decade, both through home production and more importantly through imports (3).

EIA estimates that China has 1,275 TCF (trillion cubic feet) of technically recoverable *shale gas* reserve, or 19.25% of the world's total, compared with 862 TCF in the U.S. However, China's reserve is in much more difficult topography. Moreover, existing hydraulic fracturing technologies are less advanced in China compared with America, are highly water-intensive and full of aquifer contamination risks. In any case, IEA studies (4) have shown that shale gas may serve as a bridging lower-emission fuel only if supported by a package of fuel pricing, cap-and-trade, carbon tax, and low-carbon technologies, including gas-fire efficiency and carbon capture and storage, backed by the highest social and environmental safeguards.

The United States has indicated willingness to share its advanced shale gas technologies and the Chinese government is introducing subsidies for shale gas production. While the prospects for the future of shale gas remain positive, China is exercising great caution in exploiting its own shale gas reserves, lest renewable energies and

low-carbon targets may be side-lined, let alone problems with water scarcity and soil and air pollution.

China's urban *air pollution* has become so serious that an Action Plan (5) has been issued by the State Council in September last year. This holds local and regional governments to account, including emission targets, technological and clean-energy re-structuring, industrial upgrading, energy-saving, and environmental protection. Included also is a program to switch all vehicles to "fifth-generation" models by 2017 with much higher emission specifications comparable or superior to European standards.

As transportation commonly accounts for over 70% of oil consumption, it has long been recognized that the future of cars would determine the "Oil Endgame" (6). China is very much in the race to develop *cars of the future*, in addition to reducing the use of private vehicles through better public transit systems and intelligent cities.

According to a report (7) of the Chinese Academy of Social Sciences (CASS), China is slated to build some 200 *eco-cities* in coming years, covering some 80% of all prefectures. Many of these cities will be linked by the world's largest high-speed rail network as well as smart power grids. According to a report, China spent more on smart grids than the U.S. for the first time in 2013, with \$4.3 billion invested, accounting for almost a third of the world's total (8).

China is expected to attain 70% urbanization rate by 2030 through unprecedented migration from the countryside. In April 2013, President Xi invoked the vision of "*Ecological Civilization*" for a "Beautiful China" thorough quality, efficient, and low-carbon development. A 2013 joint report (9) of the United Nations Development Program (UNDP) and the Chinese Academy of Social Sciences examined how this vision may be realized through building sustainable and liveable cities.

All in all, it remains to be seen whether the above blueprint will stand the test of time. With a fifth of the world's population, how well

China manages her energy dynamics is likely to define not only her future, for better or for worse, but also her relations with other countries and with Planet Earth.

World Energy Outlook 2014

The above prognosis sits well with the following takeaways from the latest report (12 November 2014) of the International Energy Agency (IEA) "*World Energy Outlook 2014*"(10) :

(a) *Global economic re-structuring* towards less energy-intensive development is likely to curb overall energy demand growth.

Nevertheless, world primary demand is expected to be 37% higher by 2040. Asia, particularly China, accounts for 60% of the growth, at least until 2030. Oil demand is to increase from 90 mb/d in 2013 to 104 mb/d by 2040. But growth rate is expected to slow from 2% p.a. to 1% p.a. after 2025.

(b) By 2040, world energy supply is to fall into *four almost equal categories* - (i) low carbon fuel (renewables and nuclear), (ii) oil , (iii) natural gas, and (iv) coal.

(c) *Renewables* (particularly wind, hydro and solar, in that order) are to go from strength to strength, accounting for half of global increase in energy supply, a third of total energy mix, and overtaking the share of coal by 2040, driven by China and other emerging economies.

(d) *Nuclear energy will grow only by one percentage point* to account for 12% of total energy mix by 2040, with China contributing the lion's share of 40%.

(e) By 2040, while growth in oil demand is expected to slow to near halt, *gas demand is likely to increase by over 50%*, supported by LNG trade, with the United States becoming the lowest-cost producer. But US shale gas production is expected to level off by late 2030's while US tight oil output is likely to decline by early 2020's.

(f) *Coal demand* is likely to remain 15% higher by 2040, supported by requirements in China, India, Indonesia and Australia, but the growth rate is expected to plateau in the 2020's and falling back in the 2030's except for India.

(g) Owing to the above dynamics, global temperature is likely to rise above the target of not exceeding 2 degrees Celsius (3.6 degrees Fahrenheit) compared with pre-industrial times unless vigorous mitigation measures are implemented globally

(h) Concentration of energy supply sources, rising costs of extraction, price disincentives, operating and political uncertainties are likely to continue to sustain countries' *concerns of energy security*, preventing abatement of global energy rivalries.

Conclusions

In sum, the following observations are instructive –

- (a) Russia now wants energy deals with China to forestall against Western sanctions and China is prepared to go along with them as they would enhance the security of China's energy supply and transit routes.
- (b) China's two gas deals with Russia represent only a tiny fraction of China's overall energy needs. These by no means signal China's energy dependence on Russia. Nor do they imply the formation of a Russia-China "Eastern Block" against the West.
- (c) Both China and Russia want to balance in some way against a world defined by *Pax Americana*. China, in particular, wishes to pivot to the West as a counterpoint to the U.S. Pivot to Asia.
- (d) To overcome the "Middle Income Trap", to minimize vulnerability to energy security, and to ensure long-term economic and social (and hence political) viability, China has to wean herself from over-dependency on energy and to combat pollution. Hence her robust embrace of renewable energies and drive towards a greener economy.

- (e) To build a moderately well-off economy by 2030, China is pushing ahead with history's fastest and most-extensive urbanization program. This is design to grow into an "urban economy" driven by rapid growth of a consuming middle class. This massive urbanization drive including automobiles will sustain continuing robust demand for energy.
- (f) So, notwithstanding the rapid growth of renewable energies, China with a fifth of the world's population, will continue to demand the bulk of the world's fossil energy supplies. But she is likely to shift from coal and oil to gas as a cleaner fuel.
- (g) Despite abundance of China's shale gas reserve, it is buried in much more difficult terrain compared with the United States. For fear of mounting water scarcity and environmental pollution, China is likely to resort to import of U.S shale gas rather than exploiting her own reserves indiscriminately.
- (h) All in all, Russia's energy deals with China are unlikely to impact Japan and other Asian countries very much. By comparison, China's long-term strategic shift towards cleaner and renewable energies and her gigantic urbanization program are poised to offer many opportunities for cooperation and businesses.

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- (1) <http://www.pewtrusts.org/en/research-and-analysis/reports/2014/04/03/whos-winning-the-clean-energy-race-2013> (accessed on 14 November, 2014)
 - (2) An estimate by the Worldwatch Institute, 5 January, 2014
 - (3) As noted in "China gases up for a New Golden Age" by Keith Johnson in *Foreign Policy*, 10 June, 2014, http://www.foreignpolicy.com/articles/2014/06/10/china_gasses_up_for_a_new_golden_age (accessed on 10 June, 2014)
 - (4) *Golden Rules for a Golden Age of Gas* "Special Report on Unconventional Gas", World Energy Outlook 2012, International Energy Agency

http://www.worldenergyoutlook.org/media/weowebsite/2012/goldenrules/WEO2012_GoldenRulesReport.pdf (accessed on 15 November, 2014)

- (5) *Action Plan on Prevention and Control of Air Pollution*, State Council, September 2013
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- (6) *Winning the Oil Endgame*, Amory Lovins et al, Rocky Mountain Institute, 2004
- (7) *Ecological City Green Book*, Chinese Academy of Social Science, 2013
- (8) *China beats US on smart-grid spending for first time*, Bloomberg, 19 February, 2014.
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- (9) *China National Human Development Report 2013, Sustainable and Liveable Cities, Towards Ecological Civilization*, UNDP China and Institute for Urban and Environmental Studies, Chinese Academy of Social Sciences, August 2013
http://www.cn.undp.org/content/dam/china/docs/Publications/UNDP-CH_2013%20NHDR_EN.pdf (accessed on 15 November, 2014)
- (10) An Executive Summary of the IEA report can be downloaded from -
<http://www.iea.org/Textbase/npsum/WEO2014SUM.pdf> (accessed on 23 November, 2014)