China's Energy Development and Its Global Implications

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Energy Charter Secretariat

Brussels, Belgium
October 28, 2013

Energy

- **Energy is NOT just Energy.**
- **Energy has a direct impact on almost all the major issues in the world today:**
  - **Development *(in all its aspects);***
  - **Food;**
  - **Science & technology;**
  - **Capital & finance;**
  - **Climate change;**
  - **Environment;**
  - **Population;**
  - **Military;**
  - **Geopolitics;**
  - **War & peace; etc.**

How Big Is China's Economy?

China's GDP as % of US GDP (2012):

- **China:**
  - **Official Exchange Rate: 52.67%**
  - **PPP: 79.05%**
- **Greater China:**

  (China + HK + Macau + Taiwan)
  - **Official Exchange Rate: 57.53%**
  - **PPP: 87.35%**

OECD re China as No. 1

- ***OECD announced on November 2012 and reiterated this spring that:***

  - **By 2016, China's GDP will surpass USA.**
  - **By 2060, China's GDP will be 28% of the world.**

The Largest Energy Producer

- **In 2012, China was the largest energy producer in the world.**
- **Total energy production was the equivalent of 3.62 billion ton of standard coal.**
  - **Coal at 66.4%;**
  - **Oil at 18.9%;**
  - **Gas at 5.5%。**
- **Per capital energy consumption was 2.68 ton standard coal.**
  - **About world average, but**
  - **Below developed countries.**

Astounding Growth of Power

- **In 2012, total installed capacity for power generation in China increased by 800 Million megawatts;**
- **Reaching a total capacity of 11.4 Billion megawatts.**
- **China’s TIC is growing the size of Britain's TIC every year.**

Production vs. Consumption

- **Coal**
  - **Domestic production = 3.52 Billion ton;**
- **Crude oil**
  - **Consumption = 490 Million ton**
  - **Domestic production = 207 Million ton;**
  - **Import = 283 Million Ton;**
  - **Finished oil products = 270 Million ton;**
- **Natural gas**
  - **Consumption = 147.1 Billion cm (13.0% increase);**
  - **Domestic production = 107.7 Billion cm (6.5% increase);**
  - **Import (including LNG) = 42.5 Billion cm (31.1% increase).**

Energy Sufficiency

- **China’s energy sufficiency rate was 91.4% in 2012.**

- **Self-reliance in energy development.**

The Dominance of Coal

- **In 2012, coal accounted for 66.4% of China's energy production.**
- ***(Globally, coal accounts for less than 30% of energy production.)***

- **Oil and gas = 24.4% of China's energy production.**
  - **Gas @ 5.5%**

Low Per Capita Energy Ownership

- **Coal:** 67% of the world average;
- **Crude oil:** 5.4% of the world average;
- **Natural gas:** 7.5% of the world average.

- **Per capita energy consumption compared with the developed countries:** $\approx 1/3$.

Natural Gas Consumption in China

- **Natural gas: 5.5% of China's energy production in 2012.**

- ***(Globally, natural gas accounts for about 24% of energy production.)***

- **This means that even if China quadruples natural gas consumption, it will just reach the world average.**

Non-fossil Energy

- **In 2011:**
  - **#1 in hydro power capacity;**
  - **#1 in wind power production;**
  - **#1 in solar power manufacturing;**
  - **Growing solar power generation aggressively;**
  - **#1 in the construction of new nuclear power generating sets (26 under construction);**
    - **Nuclear generating capacity will reach 39 Million kw by 2015; and 86 Million kw by 2020 (reaching 5% of China's total power generating capacity).**
    - **Total investment of Rmb1.2 Trillion from 2011 to 2020.**

Non-fossil Energy (2)

- **Non-fossil energy in China's energy production:**
  - **8.3% in 2011;**
  - **9.1% in 2012;**
  - **11.4% by 2015;**
  - **15% by 2020.**

Non-Conventional Energy

- **Increasing investment in E&P of shale gas, shale oil and oil sands.**

- **Goal: producing 6.5 Billion cm of shale gas in 2015.**

  (Still a fraction of the US shale gas production of 180 Billion cm in 2011.)

Achilles' Heel: Imported Oil

- **Dependence on imported oil has increased from 32% around 2000 to ≈ 58% in 2012.**
- **Dependence on imported oil expected to go up to 70%.**
- **Consumption of oil by 2020: ≈ 700 Million Ton**
- **Potential dangers:**
  - **Maritime security for oil shipping;**
  - **Safety and security of cross-border oil & gas pipelines;**
  - **Major jump in imported oil & gas price;**
  - **Insufficient strategic reserves.**

New Achilles' Heel: Imported Gas

- **Dependence on imported natural gas:**
  - **Became net natural gas importer in 2006;**
  - **Import @ 5.8% of total gas consumption in 2007;**
  - **Import @ ≈ 30% of total gas consumption in 2012.**
- **Consumption of natural gas:**
  - **2001: 27.4 Billion cm;**
  - **2012: 147.1 Billion cm;**
  - **2020: ≈ 350 Billion cm.**
  - **At present**
    - **Natural gas = 5.5% of China's energy production.**
    - **Only ≈ 14% of China's populations is using natural gas.**
  - **2015:**
    - **≈ 250 Million people will use natural gas**
    - **(18% of the total population).**

“We will go wherever there is oil!”

- **Promoting international energy cooperation almost in all parts of the world: Africa, Central Asia, Gulf & Middle East, North America, South America, Australia, ASEAN.**

- **Improving coordination of domestic energy production and international supply.**

- **Promoting the establishment of a new international energy order.**

Mega Trends in China's Energy Sector

- **Gas:** Ordered to go up; to double in five years;
- **Crude oil:** Has to increase; adding at least 200 million tons to total consumption by 2020; may add 300 million tons instead;
- **Coal:** Ordered to go down: to 60%, or even 50%?
- **Nuclear:** Need to go up: to 5%, or even 10%?
- **Hydro**: How much more can it grow?
- **New & Renewable:** Has to keep faith and keep making efforts. But, alas, when can they really hold up a piece of the sky?

- **The great variables**:
  - Shale gas & gas hydrate: When and how can they be developed en masse? (Shale gas as a bonus; or as an insurance policy)
  - Improving energy efficiency: How to improve? How much to improve?

Pillars of China's Energy Strategy

- **Energy savings!**
- **Maintain more or less energy sufficiency at home;**
- **Diversify energy supplies, especially oil and gas;**
- **Total energy policy: leave nothing out;**
- **Environmental protection;**
- **Deepen political and economic reform: how to deal with the SOE monopoly?**
- **Increase international cooperation;**
- **Improve people's livelihood;**
- **Promote innovation in energy production and consumption;**
- **Build a safe, stable, economic and clean modernized energy structure;**
- **Promote sustainable energy development.**

- **Since China lives in a glass house as far as energy is concerned, China wants to be friends with all, and be enemy with none.**

If There Were No SG

- **For China:**
  - **Continue to rely heavily on coal;**
  - **Need to dramatically increase import of oil;**
  - **Dependence on imported oil may go up to as high as 80%;**
  - **Worsening emission problem;**
  - **Greater environmental degradation;**
  - **Increasingly fragile and unstable geopolitical situation relating to energy security.**

If There Were No SG

- **For the USA:**
  - **Continue to rely heavily on imported O&G, especially from politically unstable countries and regions;**
  - **Deteriorating job crisis;**
  - **Worsening federal and local budget deficits;**
  - **Worsening debt crisis;**
  - **Increasingly pessimistic prospect for the future of America.**

If There Were No SG

- **For China and the USA:**
  - **China and USA would continue to import a lot of O&G;**
  - **China and USA would eventually compete for the same barrel of oil;**
  - **Greater shortage of oil;**
  - **Higher oil prices,**
  - **Eventual confrontation or even war over energy.**

- **The world without SG would be a terrifying world.**

America’s Energy Independence

- **Energy independence will be America’s Second Independence.**
- **America is moving aggressively to achieve EI, mainly by focusing on SG.**
- **By 2020, half of its crude oil consumption may be domestically produced.**
- **By 2035, America may no longer need to import crude oil from the Middle East.**

What Will SG Bring?

- **Abundant supply of gas;**
- **Cheaper gas prices;**
- **Cheaper oil prices;**
- **Less dependence on oil;**
- **Less dependence on coal;**
- **Less emission and pollution;**
- **Etc.**

What Will SG Bring?

- **Less dependence on the Middle East;**
- **De-strategization of oil;**
- **Moot the potential competition between China and USA over the same barrel of oil;**
- **Moot the potential confrontation between China and USA over energy competition.**
- **This will help significantly reduce the potential friction and confrontation between China and USA. This has profound war & peace implications for decades to come.**

The Abundance of Gas

“Gas, gas, everywhere,
Quite a lot is from shale.

“Gas, gas, everywhere,
Not a single cube to waste.

“Gas, gas, everywhere,
Age of oil is to end.”

“Gas, gas, everywhere,
Age of gas is at hand.”

--- Victor Gao **(at the 2nd Int’l SG Conference in Seoul, September 10, 2013)**

SG in Transition

- **Moving from “unconventional energy” to “mainstream energy”;**
- **Moving from a possibility to a reality;**
- **Moving from a dispensable and insignificant thing to a major energy contributor;**
- **Moving from the margin of the energy sector to its center stage;**
- **Creating a real revolution in energy;**
- **The SG revolution will spread from USA to China and elsewhere.**

From O&G to G&O

- **The age of O&G will come to an end.**
- **The age of G&O will arrive.**

From O&G to G&O

- **Personal disclaimer:**
  - **GAO 高**
  - **G&O**

Global Implications

- **The SG-triggered global energy revolution will have profound implications to many stakeholders in the world:**
  - **Producers of O&G;**
  - **Exporters of O&G;**
  - **Importers of O&G;**
  - **Traders of O&G;**
- **The current supply & demand patterns in O&G will change profoundly.**
- **The prices of O&G will change profoundly.**
- **Anyone who fails to grasp the profound significance of the SG-triggered global energy revolution will do so to his or her own harm.**

How Much SG Does China Have?

- **China is the most "substantive" country in the world: average altitude at 1,141 meters;**
- **6 million sq.km of land (total = 9.6 million sq.km) has SG reserves.**
- **China has the largest SG reserves in the world;**
- **Total SG reserves at 134.42 trillion cubic meters (not including the Qinghai-Tibet plateau and China's off-shore areas).**

- **The abundant SG reserves will boost China's confidence in its energy security and reduce its fear of vulnerability.**

Gas Hydrate

- **Preliminary estimates also indicate:**
  - **China has gas hydrate reserves equal to 60 billion tons oil equivalent in the offshore areas; and**
  - **Equal to 35 billion tons oil equivalent in the permafrost areas in the Qinghai-Tibet areas.**
- **This will further enhance China's confidence in its energy security.**

Barriers to Overcome

- **Legal ownership structure;**
- **Water resources;**
- **Potential underground water contamination;**
- **Geological conditions;**
- **Pipelines and other infrastructures;**
- **Technologies and know-how;**
- **Economy of scale;**
- **Who wants to do what, why, when, and how?**

China and SG

- **Will China ever be a net exporter of G&O?**
  - **Impossible w/o SG, unless renewable sources of energy dramatically increase and become a major contributor to China's energy consumption;**
  - **No longer impossible with SG.**
- **China itself controls the pace and process of how to develop its SG resources.**
- **The key is good speed, not great haste.**

China Fully Supports America's EI

- **America needs to achieve EI:**
  - **To reduce dependence on imported energy;**
  - **To increase revenue and reduce deficit and indebtedness; and**
  - **To create more jobs.**
- **China has all the reasons to fully and whole-heartedly support America's EI.**
- **The faster and the better America achieves EI, the better for China.**

AmeriChina

- **AmeriChina = America + China**

- **China will fully support America's EI and is willing to provide:**
  - **Capital;**
  - **Equipment; and**
  - **Uptake for oil & gas produced in other countries thus freed up by America's EI.**

Chinada

- **Chinada = China + Canada**
- **CNOOC + Nexen**
- **China can significantly help Canada to become an “energy superpower”, by providing:**
  - **Capital (US$100 Billion earmarked for the coming few years);**
  - **Equipment; and**
  - **Long-term, reliable and increasing demand.**

Americhinada

- **Americhinada = America + China + Canada**
- **A new trilateral oil & gas relations?**
- **China can provide capital and equipment to help America achieve EI.**
- **China does not need to import oil & gas from America, if US doesn't want to sell it to China.**
- **China can provide capital, equipment and demand to Canada, especially when America no longer needs to import that much oil & gas from Canada in the future.**
- **A win-win-win situation.**

The Rest of the World

- **With America achieving EI, China can provide demand for the O&G that America will no longer import from the rest of the world, including the Middle East, Africa and Latin America.**
- **China will also increase energy cooperation with Russia, Central Asian countries, Australia, etc.**
- **What are the economic, strategic and geopolitical implications from this major shift in the global O&G market?**

China & OPEC

- **At present, half of China's imported oil comes from the Middle East, and 1/3 of its imported oil comes from Africa.**

- **China will continue to heavily depend on OPEC members for its imported O&G for many years to come.**

Energy Revolution

- **We are faced with an energy revolution in the world, triggered mostly by SG.**

- **The rigid divide between conventional vs. non-conventional energies is fast coming down.**

- **America's EI will profoundly change the existing supply-and-demand equations in the global energy sector, and will create profound geopolitical implications.**

The De-Strategization of Oil

- **Ever since the WWI, oil has been an important strategic commodity.**
- **Many wars have been fought for control of oil.**
- **Kissinger: Control of oil means control of the world.**
- **The energy revolution will result in the de-strategization of oil.**
- **America's restless engagements in the Middle East and other regions are expected to be reduced significantly in the coming decades.**
- **America will be reshaped by its EI.**

ASIA


RUSSIA
CHINA
INDIA
INDONESIA
KAZAKHSTAN
MONGOLIA
IRAN
AFGHANISTAN
PAKISTAN
BURMA
THAILAND
VIETNAM
LAOS
CAMBODIA
PHILIPPINES
MALAYSIA
BRUNEI
SINGAPORE
NORWAY
SWEDEN
FINLAND
BELARUS
UKRAINE
UZBEKISTAN
TURKMENISTAN
KYRGYZSTAN
TAJIKISTAN
NEPAL
BHUTAN
BANGLADESH
SRI LANKA
MALDIVES
TAIWAN
JAPAN
NORTH KOREA
SOUTH KOREA
Arctic Ocean
Norwegian Sea
Barents Sea
Kara Sea
Laptev Sea
East Siberian Sea
Bering Sea
Sea of Okhotsk
Sea of Japan
Yellow Sea
East China Sea
South China Sea
Philippine Sea
Arabian Sea
Bay of Bengal
Andaman Sea
Indian Ocean
Celebes Sea
Banda Sea
Java Sea
Timor Sea
Sulu Sea
Gulf of Thailand
Laccadive Sea
Caspian Sea
Aral Sea
Lake Baikal
Lake Balkhash
Lake Ladoga
Lake Onega
Arctic Circle
Tropic of Cancer
Equator
Moscow
Saint Petersburg
Kyiv
Minsk
Warsaw
Helsinki
Stockholm
Oslo
Copenhagen
Murmansk
Arkhangel'sk
Noril'sk
Yakutsk
Magadan
Petropavlovsk-Kamchatskiy
Anadyr
Provideniya
Cherskiy
Tiksi
Novosibirsk
Krasnoyarsk
Omsk
Irkutsk
Chita
Khabarovsk
Vladivostok
Sapporo
Tokyo
Yokohama
Nagoya
Osaka
Fukuoka
Pusan
Seoul
Pyongyang
Harbin
Changchun
Shenyang
Dalian
Beijing
Tianjin
Baotou
Ürümqi
Lanzhou
Xi'an
Taiyuan
Qingdao
Jinan
Zhengzhou
Nanjing
Shanghai
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Chengdu
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Changsha
Nanchang
Guiyang
Kunming
Guangzhou
Nanning
Hong Kong S.A.R.
Macau S.A.R.
Taipei
Hanoi
Haiphong
Vientiane
Da Nang
Ho Chi Minh City
Phnom Penh
Bangkok
Mandalay
Rangoon
Nay Pyi Taw
Chittagong
Dhaka
Kolkata
Patna
Kathmandu
Thimphu
Lhasa
Kanpur
Lucknow
Jaipur
New Delhi
Ludhiana
Karachi
Islamabad
Faisalabad
Lahore
Quetta
Kandahar
Kabul
Tashkent
Bishkek
Almaty
Astana
Qaraghandy (Karaganda)
Atyraū (Atyrau)
Dushanbe
Kashi
Ashgabat
Baku
Tbilisi
Yerevan
Tabrīz
Mashhad
Eşfahān
Shīrāz
Bandar 'Abbās
Doha
Abu Dhabi
Muscat
Ahmadābād
Surat
Indore
Mumbai
Pune
Hyderābād
Vishākhapatnam
Chennai
Bengaluru
Cochin
Jaffna
Colombo
Male
Medan
Palembang
Jakarta
Semarang
Surabaya
Bandung
Pontianak
Kuala Lumpur
Singapore
Bandar Seri Begawan
Manila
Quezon City
Cebu
Davao
Luzon
Mindanao
Sulawesi (Celebes)
Ambon
Dili
TIMOR-LESTE
Sumatra
Java
Borneo
Ryukyu Islands (Japan)
Okinawa
Kuril Islands
Sakhalin
Ocuppied by the Soviet Union in 1945, administered by Russia, claimed by Japan.
Scale 1:48,000,000
Azimuthal Equal-Area Projection
0 800 Kilometers
0 800 Miles

The Trans-Asia Pipelines?

- **China and Turkmenistan already linked by pipelines, at 10,000 km at the longest.**
- **Turkmenistan gas is being supplied to China all the way to the Chinese coast.**
- **Turkmenistan is just one or several steps away from Iran and other Middle East countries.**
- **The closest distance between China and South Korea at sea is about 300 km;**
- **The closest distance between South Korea and Japan is about 100 km.**
- **Thinking the unthinkable?**
- **Making the impossible possible?**
- **A Trans-Asia Pipelines from the Middle East to East Asia, including China, South Korea and Japan?**

China's Ultimate Goals

- **20% of global economy**
  - **11.51% in 2012 (*official exchange rate*).**
  - **14.87% in 2012 (*ppp*).**

- **20% of global trade**
  - **2012 total foreign trade @ US$3.87 Trillion; at 47% of GDP.**
  - **10.58% of global trade.**

- **20% of IPR**
  - **China surpassed USA in 2011 as the largest country in the world in new patent applications.**

- **20% of Fortune 500 companies**
  - **95 in 2012 (Mainland China, Hong Kong and Taiwan).**

China in the Coming Decade

- **China will be the largest economy in the world.**

  ≈20% of the global economy; ≈20% of global trade.

- **China will be the largest importer of G&O, and will continue to invest in mega deals in G&O throughout the world.**

- **China will be a major investor in America's G&O sector.**

- **America may start to export some G&O to China.**

- **Rmb will become a major reserve currency.**

- **China will have greater democracy and transparency and better governance and rule of law than today.**

Thank you very much!

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