The Maritime Energy Transportation of China: Security Risks and Solutions

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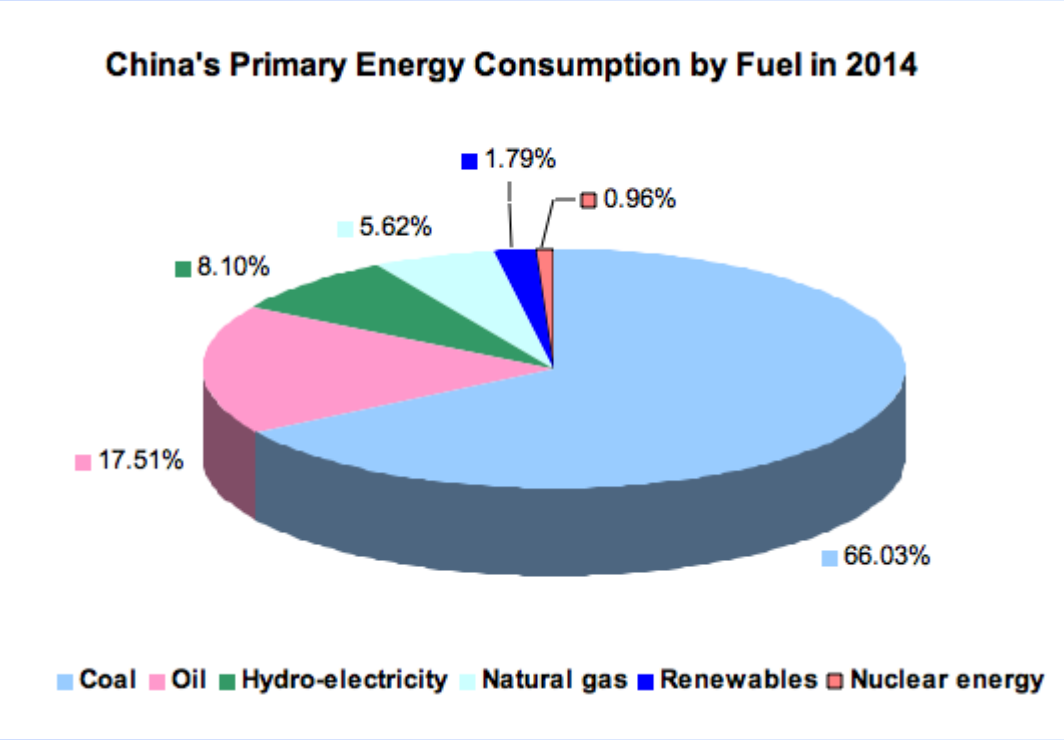
Outline

- Energy Consumption and Imports of China
- Risks in China's Seaborne Transportation
- China's Solutions to Hedging Seaborne Transportation Risks
- Conclusions

Energy Consumption of China

China's energy consumption grew by 2.6% in 2014, consuming primary energy of 2972.1 million tons oil equivalent.

China remained the world's largest energy consumer and accounted for 23% of global energy consumption and 61% of net global energy growth.



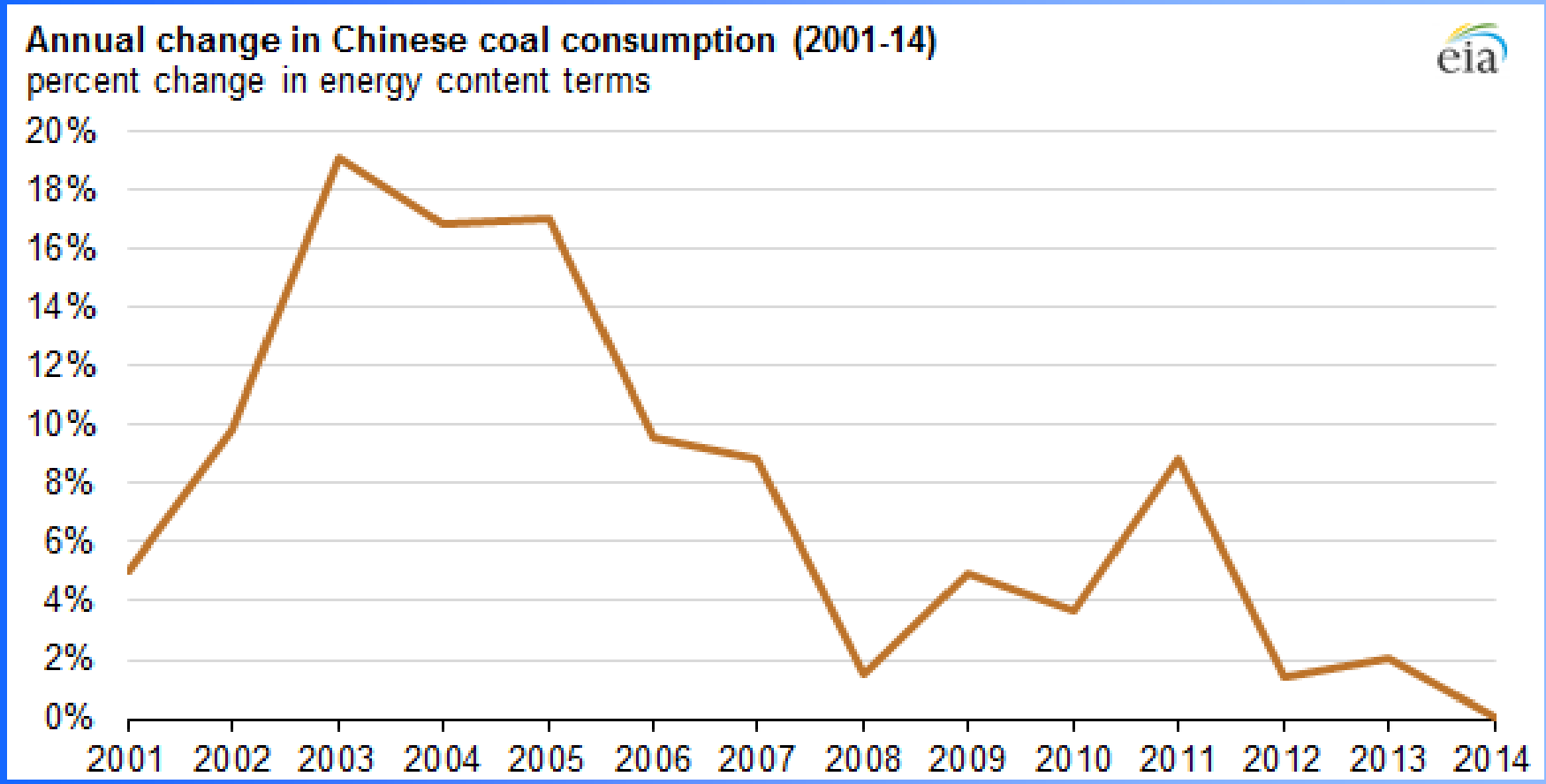
China's Fossil Fuel Consumption in 2014

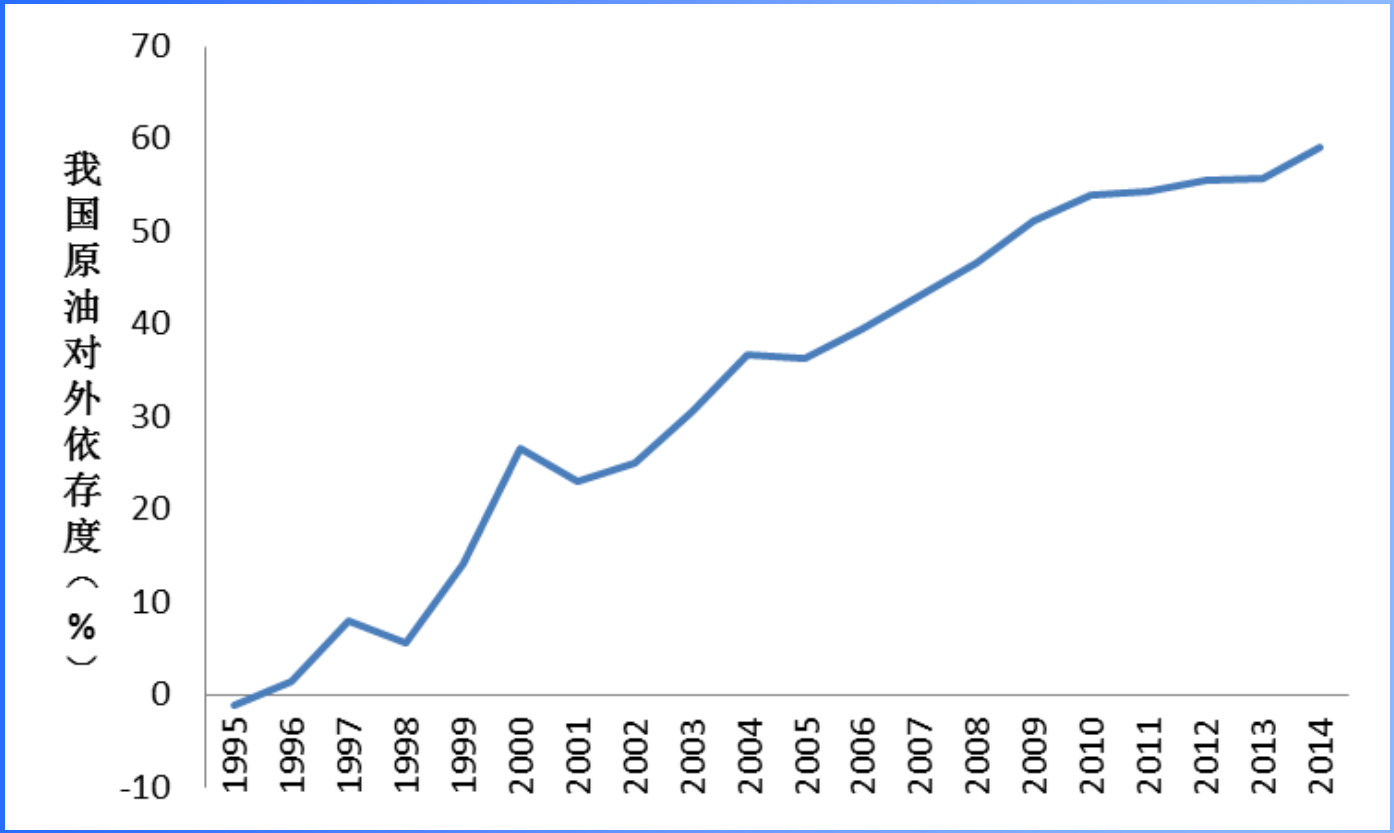
- Oil : 520.3 million tons (11.06 million bbl/d), 3.3% higher than in 2013,accounting for 12.4% of the world total
- Natural Gas : 185.5 bcm (17.9 bcf /d, 45.6 million tons of oil equivalent), 8.6% higher than in 2013,accounting for 5.4% of the world total
- Coal : 1962.4 million tons of oil equivalent, 0.1% higher than in 2013, accounting for 50.6% of the world total

Energy Imports of China

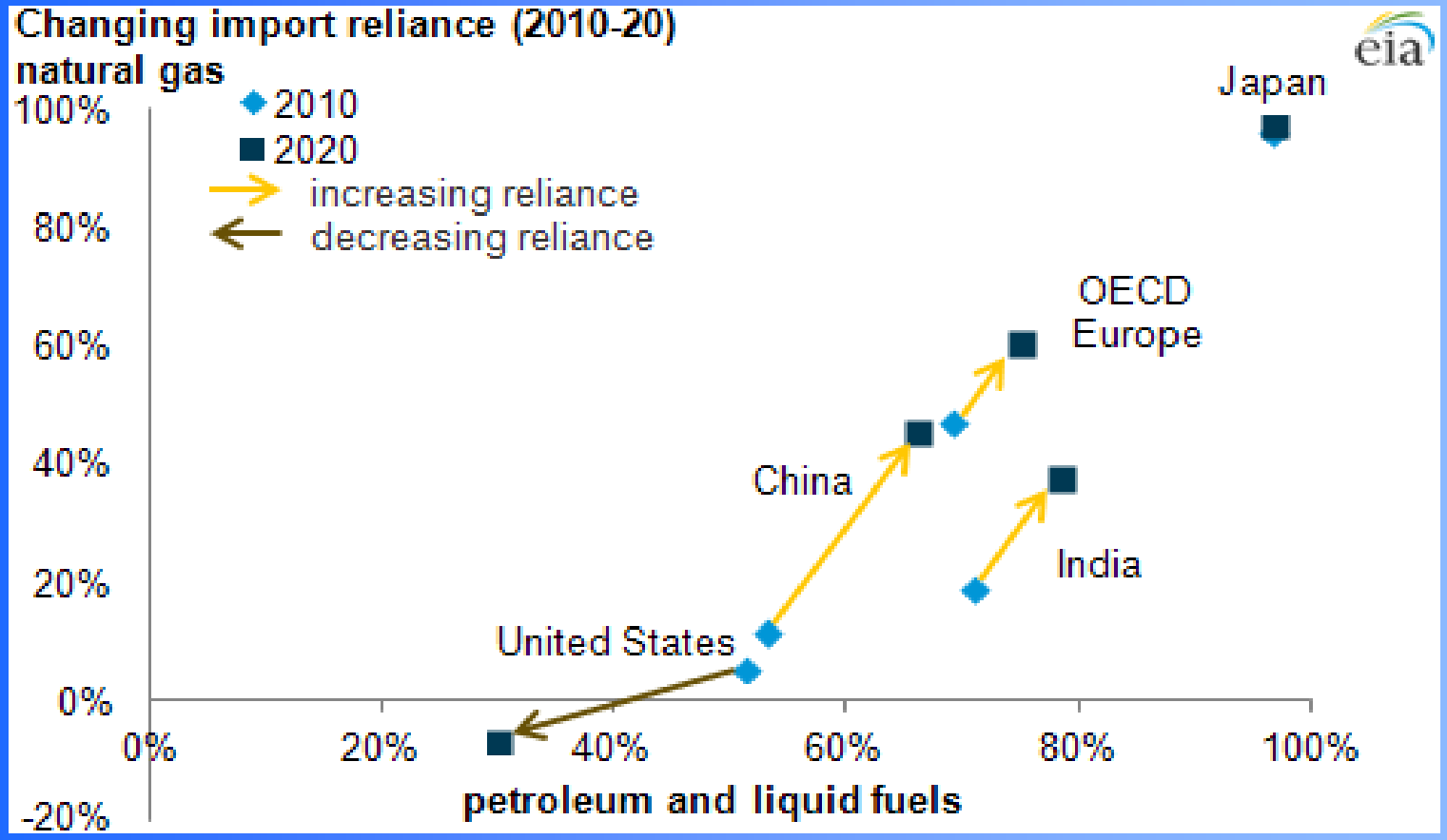
China's Energy Imports in 2014

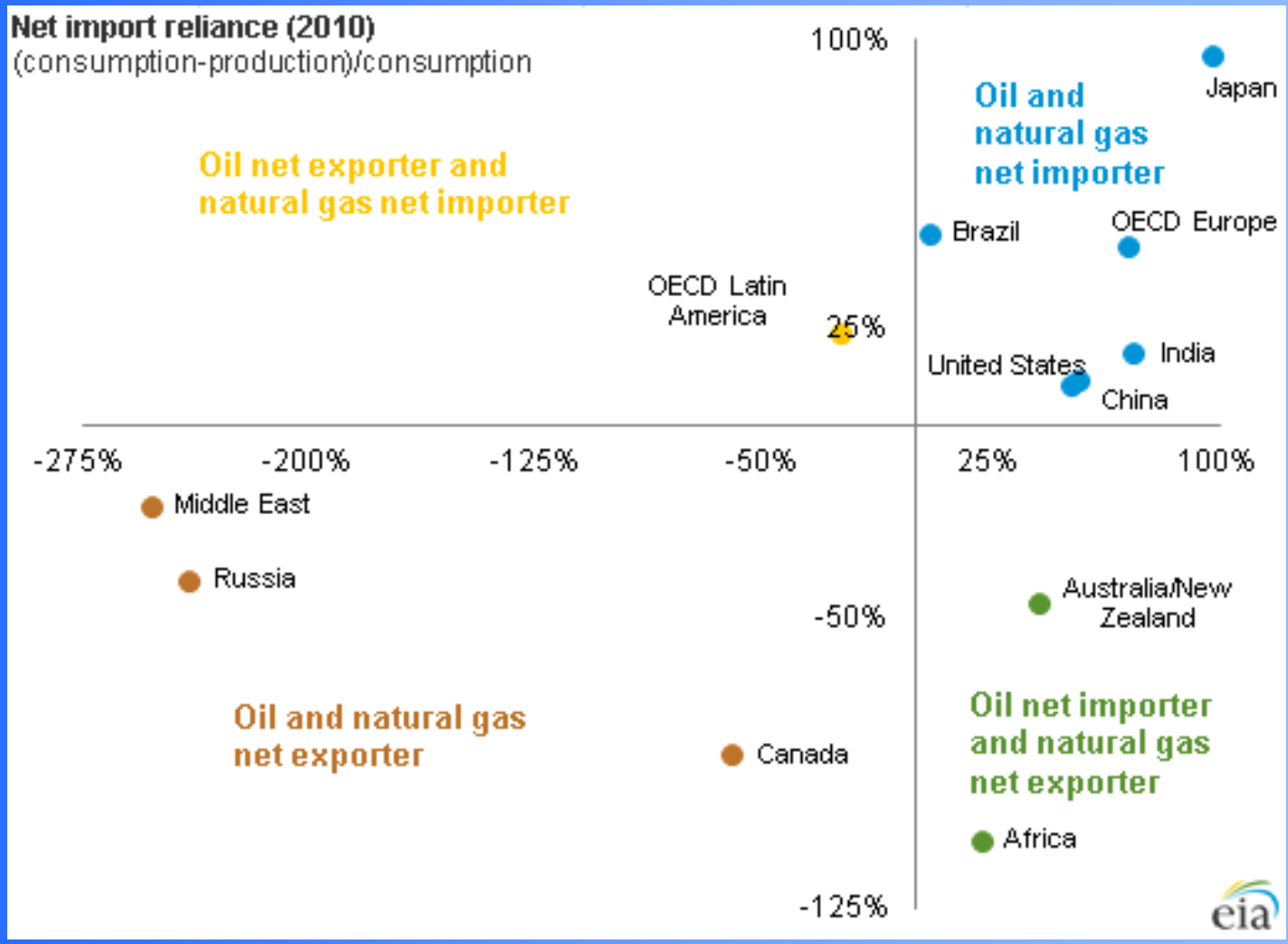
- 308.4 million tons of crude oil (6.2 million bbl/d, an increase of 9.45% over 2013, dependence rate at 59.6%
- 42.87 million tons of gas in total(58.3 bcm), 19.85 million tons of LNG (27 bcm) and 23.02 million tons of pipeline-transported gas (31.3 bcm), dependence rate at 32%
- 291 million tons of coal in total, 10.9% less than in 2013, dependence rate at 8%


Annual change in Chinese coal consumption (2001-14)
percent change in energy content terms
eia
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014



China’s Reliance on Crude Oil Imports(%)


Changing import reliance (2010-20)
natural gas
eia
2010
2020
increasing reliance
decreasing reliance
Japan
OECD
Europe
China
India
United States
100%
80%
60%
40%
20%
0%
-20%
0%
20%
40%
60%
80%
100%
petroleum and liquid fuels


Net import reliance (2010)
(consumption-production)/consumption
100%
25%
-50%
-125%
-275%
-200%
-125%
-50%
25%
100%
Oil and natural gas net importer
Japan
Brazil
OECD Europe
India
United States
China
Oil net exporter and natural gas net importer
OECD Latin America
Middle East
Russia
Australia/New Zealand
Oil and natural gas net exporter
Canada
Oil net importer and natural gas net exporter
Africa
eia

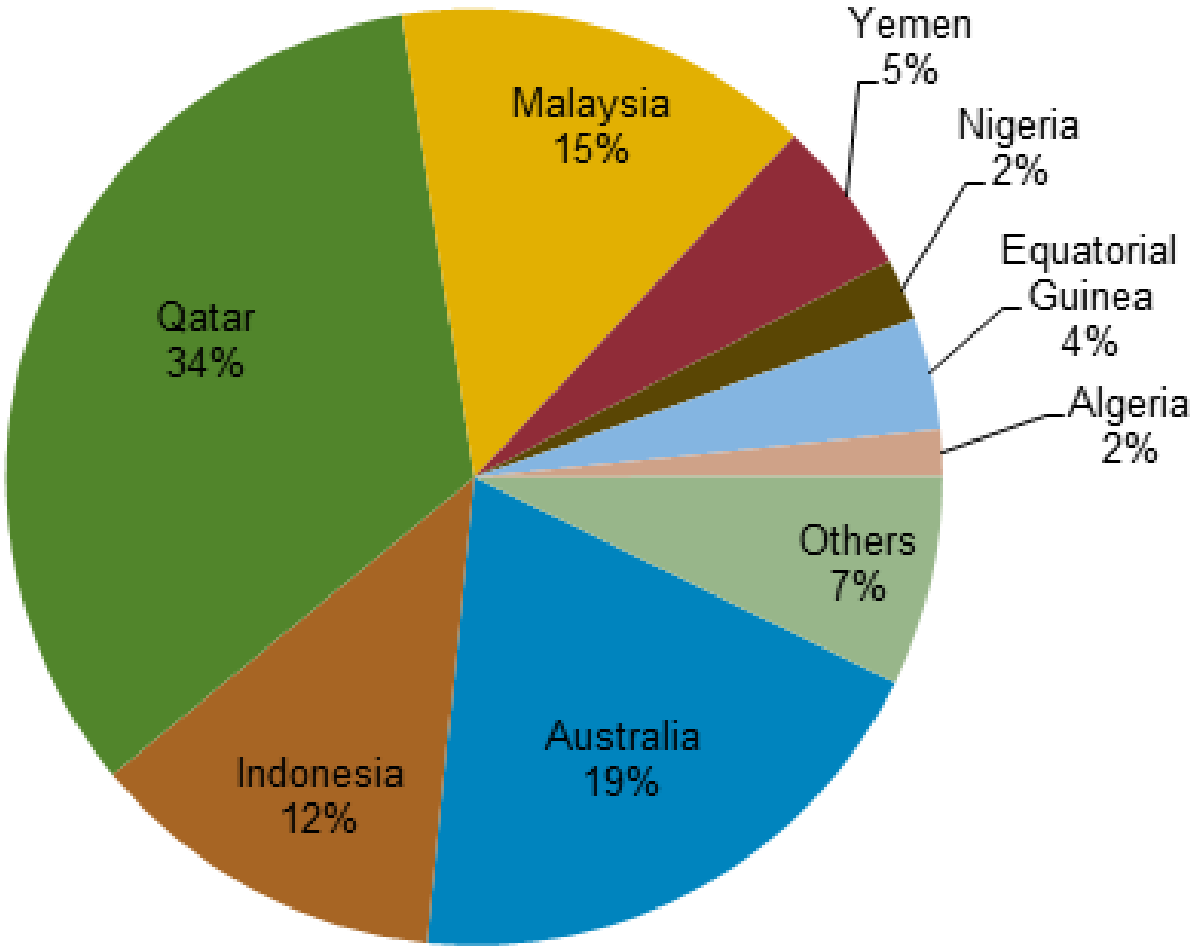
China's Crude Oil Imports by source, 2014

Country	Quantity/Number	Ratio	Country	Quantity/Ton	Ratio
Saudi Arabia	49,665,924	16.11%	Mongolia	1,030,843	0.33%
Angola	40,649,034	13.18%	Vietnam	1,482,481	0.48%
Russia	33,106,943	10.74%	Canada	201,616	0.07%
Oman	29,743,576	9.65%	Australia	2,727,150	0.88%
Iran	27,462,540	8.91%	Mexico	682,302	0.22%
Iraq	28,578,213	9.27%	Argentina	322,332	0.10%
Kuwait	10,618,772	3.44%	Aruba	277,716	0.09%
Venezuela	13,786,231	4.47%	Papua New Guinea	77,279	0.03%
The United Arab Emirates	11,652,132	3.78%	Bolivia	237,440	0.08%
Columbia	10,091,321	3.27%	Qatar	360,995	0.12%
The republic of Congo	7,050,981	2.29%	Algeria	898,397	0.29%
Brazil	7,019,138	2.28%	Chad	143,130	0.05%
Equatorial Guinea	3,249,057	1.05%	Indonesia	375,457	0.12%
South Sudan	6,443,655	2.09%	Malaysia	217,328	0.07%
Kazakhstan	5,686,422	1.84%	Pakistan	16,031	0.01%
the Republic of Yemen	2,499,508	0.81%	Great Britain	1,219,394	0.40%
Egypt	946,020	0.31%	Norway	145,999	0.05%
The Gabonese Republic	1,554,808	0.50%	The Republic of Azerbaijan	222,003	0.07%
Nigeria	1,996,445	0.65%	Brunei	81,933	0.03%
Ecuador	746,635	0.24%	Libya	965,547	0.31%
Sudan	1,773,902	0.58%	Democratic Republic of the Congo	968,183	0.31%
The Republic of Ghana	879,553	0.29%	World's Total	**308,374,104**	**100%**
Cameroon	519,737	0.17%			

China's Natural Gas Imports by source, 2014

Country	Quantity/ton	Ratio	Country	Quantity/ton	Ratio
Qatar	6,735,327	15.71%	Oman	129,116	0.30%
Australia	3,811,420	8.89%	Angola	127,794	0.30%
Indonesia	2,554,854	5.96%	Norway	122,792	0.29%
Malaysia	2,992,982	6.98%	Republic of Trinidad and Tobago	119,240	0.28%
the Republic of Yemen	1,033,218	2.41%	Egypt	119,579	0.28%
Equatorial Guinea	718,129	1.68%	Brunei	115,409	0.27%
Nigeria	428,192	1.00%	Turkmenistan	18,743,440	43.72%
Papua New Guinea	286,076	0.67%	Myanmar	2,200,880	5.13%
Algeria	236,080	0.55%	Uzbekistan	1,787,321	4.17%
Spain	187,712	0.44%	Kazakhstan	291,403	0.68%
Russia	129,670	0.30%			
Total	19847590(LNG)+23023044(pipe)=42870634 tons				

China LNG import sources, 2014



Source: IHS Energy.
Others: Angola, Brunei, Egypt, Norway, Oman, Papua New Guinea, Russia, Trinidad & Tobago, and re-exports from Spain and South Korea.

China's Coal Imports by Source, 2014

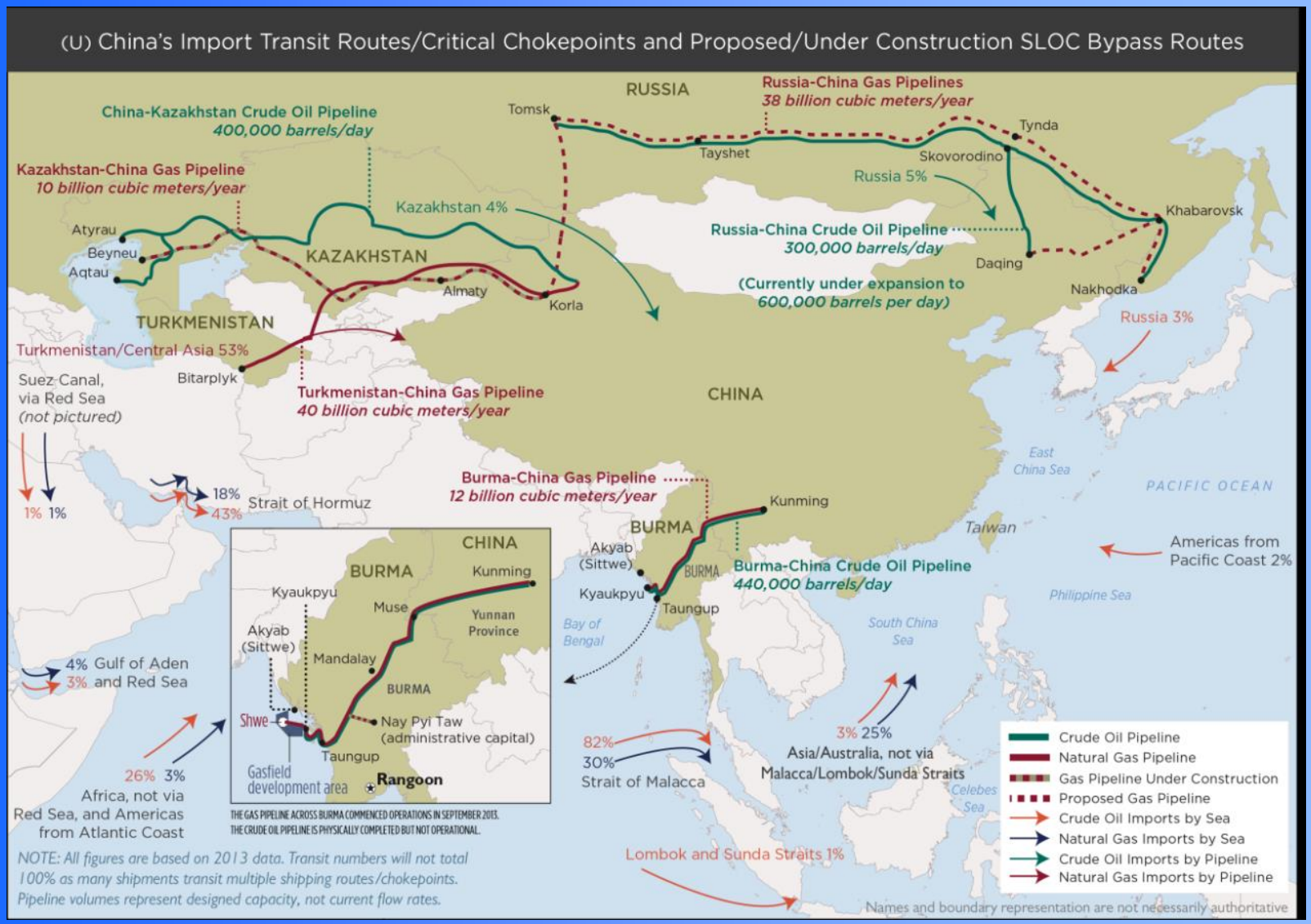
Country	Import Volume (ten thousand tons)	Proportion
Indonesia	10605.8	36.42%
Australia	9441.6	32.42%
Russia	2539.2	8.72%
Mongolia	1926.9	6.62%
DPRK	1546.6	5.31%
Canada	819.7	2.81%
Vietnam	683.1	2.35%
South Africa	575.7	1.98%
Philipines	486.1	1.67%
America	378.5	1.30%
Others	118.9	0.41%
Total	29122.1	100.00%

Energy Imports of China

- **China's Energy Transportation by Sea in 2014**
- Crude oil: 88%
- Natural gas: 46%
- Coal: 85%

Five sea routes for energy transportation

- Middle East Route (the Persian Gulf – the Strait of Hormuz – the Gulf of Oman –the Strait of Malacca - Destination) channeled 52% of China's total crude oil imports and 40% of China's total LNG imports
- North Africa Route (North Africa –the Mediterranean - Suez Canal - Red Sea - Indian Ocean –the Strait of Malacca - Destination) channeled 4.89% of China's total crude oil imports and 9% of China's total LNG imports
- South Africa route(including Latin American Region) (West African seas - South African seas - Cape of Good Hope - Indian Ocean – the Strait of Malacca - Destination) channeled 25.29% of China's total crude oil imports, 6% of China's total LNG imports and 1.98% of China's total coal imports
- Australian Route (Australia - Coral Sea - Solomon Sea near Papua New Guinea - seas on the east of Philippines - Destination) channeled 1.61% of China's total crude oil imports and 20% of China's total LNG imports and 36.4% of China's total coal imports
- American and Pacific Route (Americas - Pacific - Destination) channeled 3.89% of China's total crude oil imports and 4.1% of coal imports



Source: Annual Report to Congress: Military and Security development Involving the People's Republic of China

Risks in China's Seaborne Transportation

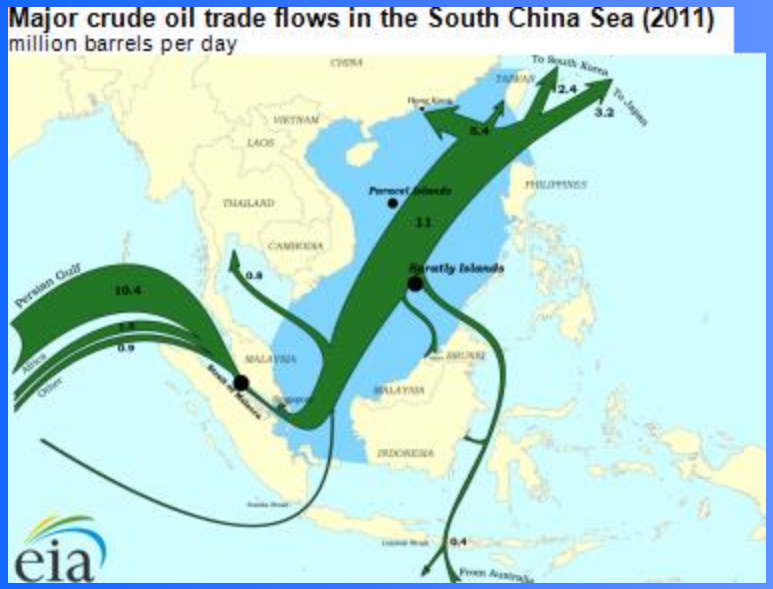
- **Three major risks:**

- Threats of Pirates
- Impacts of Regional Conflicts
- Blockade or sanction by superpower

Risks in China's Seaborne Transportation

- **Threats of Pirates**

  Piracy shows a declining trend globally while rising in Asian seas


Major crude oil trade flows in the South China Sea (2011)
million barrels per day
To South Korea
To Japan
12.4
3.2
5.4
Paracel Islands
11
Spratly Islands
0.8
Persian Gulf
10.4
1.5
0.9
0.4
From Australia
eia


Major LNG trade flows in the South China Sea (2011)
trillion cubic feet
To South Korea
To Japan
1.4
3.4
0.6
0.6
Paracel Islands
Spratly Islands
0.0
Persian Gulf 2.1
0.9
0.9
eia

Risks in China's Seaborne Transportation

- **Impact of Regional Conflicts**

- Two regions: Middle East(52% crude oil, 40%LNG)
  Africa(22% crude oil, 8%LNG)

- Two choke points: The Strait of Hormuz(43% crude oil, 4% LNG)
  The Strait of Malacca(82% crude oil, 56%LNG)

Risks in China's Seaborne Transportation

➢ Blockade or sanction by superpower

- US Naval power:In terms of the total numbers of major combatants, the US Navy has a two-power standard over the Chinese and Russian fleets: 203 ships to their 205. In aggregate tonnage, the US Navy has a 13 power standard, with a 263:1 advantage over a combined Russian –Chinese fleet
- Offshore Control Strategy: "deny China the use of the sea inside the first island chain…dominate the air and maritime space outside the island chain" ;"use a combination of air, naval, ground and rented commercial platforms to intercept and divert the supertankers and very large container ships essential to China's economy"---- T.X. Hammes.
- China's weakness: 70% of maritime imported crude oil are transported by foreign tankers

China's Solutions to Hedging Seaborne Transportation Risks

- Enhancing energy independence
- Construction of overland pipelines
- Cooperation with countries along the maritime routes
- Actively taking antipiracy escort actions and related drills
- Building capability of safeguarding SLOC

Enhancing energy Independence

Energy Development Strategy Action Plan (2014-2020)

The Plan aims to reduce China's high energy consumption per unit GDP ratio through a set of measures and mandatory targets, promoting a more efficient, self-sufficient, green and innovative energy production and consumption.

The targets include a cap on annual primary energy consumption set at 4.8bn tons of the standard coal equivalent until 2020, with a need to limit the annual growth rate of primary energy consumption to 3.5% for the next six years. The annual coal consumption should be held below 4.2bn tons until 2020 (The share of non-fossil fuels in the total primary energy mix is to rise to from 9.8% in 2013 to 15% by 2020, with an indicative 20% share by 2030. The share of natural gas is to rise to above 10%, while that of coal will be reduced below 62%. In addition, installed nuclear power capacity is to reach 58GW by 2020, with additional 30GW expected to be under construction in 2020. Installed capacity of hydro-, wind and solar power in 2020 is expected to reach 350GW, 200GW and 100GW, respectively. Energy self-sufficiency should reach around 85%.

Construction of Overland Pipelines

- Russia-China oil and gas pipelines

- Oil pipeline (from Skovorodino of Russia to Daqing of China),designed to transport 15 million tons of crude oil per year from 2011 to 2030)
- Gas pipeline:East route(designed transmission capacity is 61 bcm/ year) will be completed in 2018.According to a CNPC-Gazprom contract, the Russian side will export 38 bcm to China every year for a 30-year period; West Route is still on discussion


Russia-China pipeline
RUSSIA
RUSSIA
PACIFIC OCEAN
Taishet
Skovorodino
Lake Baikal
Daqing
MONGOLIA
CHINA
BEIJING
600 km
Pipeline links the world's biggest oil producer (Russia) with the largest energy consumer (China)
Source: EIA
AFP


RUSSIA
GAZPROM
NIZHNEVARTOVSK
KRASNOYARSK
BOGUCHANY
YAKUTIA
IRKUTSK
SKOVORODINO
KOMSOMOLSK-ON-AMUR
TOMSK
KRASNOYARSK
NOVOSIBIRSK
PROSKOKOVO
NOVOKUZNETSK
ABAKAN
BARNAUL
BIYS
GORNO-ALTAISK
BALAGANSK
IRKUTSK
CHITA
BLAGOVESCHENSK
BIROBIDZHAN
DALNORECHENSK
CHINA
VLADIVOSTOK
CNPC
ULAN-BATOR
MONGOLIA
CHINA

Construction of Overland Pipelines

- Central Asia-China oil and gas pipelines:

- Kazakhstan-China oil pipeline(from Atyrau of Kazakhstan to Alashankou of China) was put into commercial operation in 2006. The pipeline's initial capacity was 200000 bbl/d, and an expansion in 2013 along the route from central Kazakhstan to China doubled the capacity to 400000 bbl/d
- Four gas pipelines----Line A, Line B and Line C(starts at Gedaim on the Turkmen-Uzbek border, run through Uzbekistan and Kazakhstan and ends at Horgos of China) have been completed, Line D(run through Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan) will be completed in 2016, total designed capacity is 85 bcm/ year

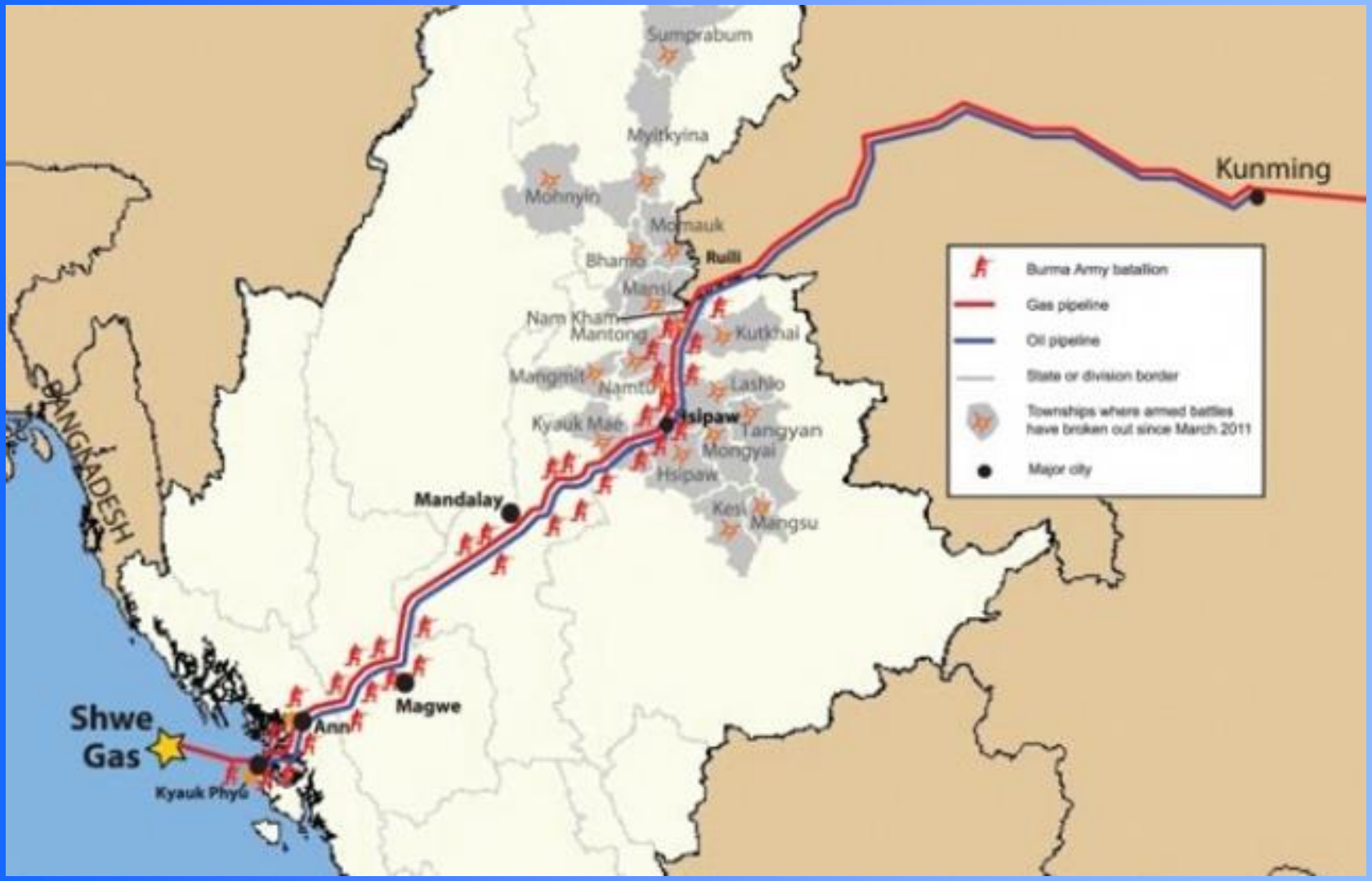
Central Asia-China Gas pipelines

Line A, Line B and Line C in parallel
Length: 1830km(single line)
Total annual capacity: 55bcm

Construction of Overland Pipelines

- Myanmar-China oil and gas pipelines

  From the Myanmar port of Kyaukpyu to the Chinese city of Kunming in parallel with designed transmission capacity of 22 million tons of crude oil and 12 bcm of natural gas per year.By January 25th 2015, Myanmar –China natural gas pipeline had transmitted 4 bcm gas to China. Myanmar-China crude oil pipeline started a trial operation on January 29th 2015.


Sumprabum
Myitkyina
Mohnyin
Momauk
Bhamo
Ruili
Mansi
Nam Kham
Mantong
Kutkhai
Mangmit
Namtu
Lashio
Kyauk Mae
Hsipaw
Tangyan
Mongyai
Mandalay
Kesi
Mangsu
Kunming
BANGLADESH
Shwe
Gas
Kyauk Phyu
Ann
Magwe
Burma Army batallion
Gas pipeline
Oil pipeline
State or division border
Townships where armed battles have broken out since March 2011
Major city

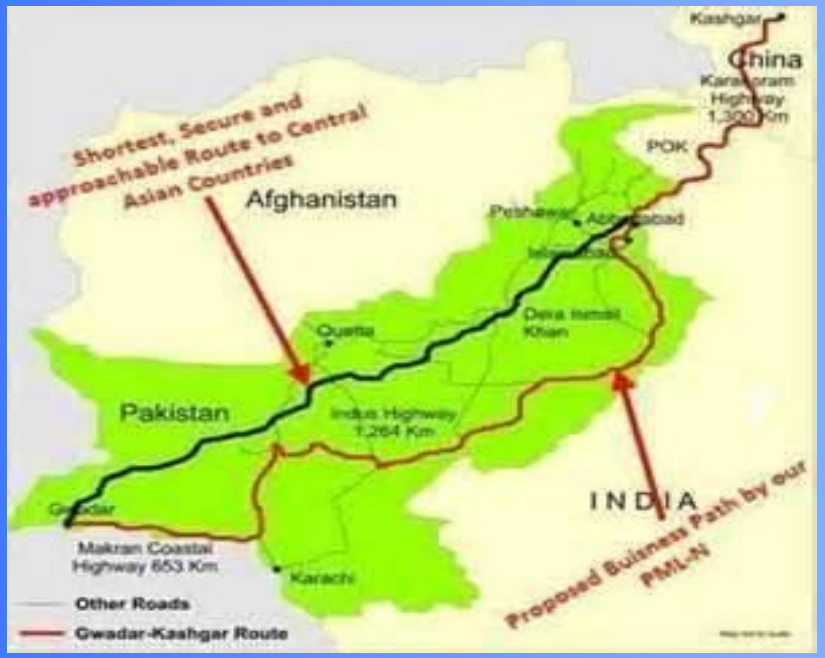
Construction of Overland Pipelines

- Potential energy transportation routes

- Pakistan-China energy corridor?

  Oil transport costs could run to at least ten dollars a barrel.

  Geographic and security barriers render a Pakistan-China oil pipeline unfeasible.



China-Pakistan Economic corridor

Gwadar Port

Karakoram Highway

The Arctic Northern Sea Route?

Obstacles: the irregularity of sea ice; legal deficiencies; lack of search and rescue, poor access to ports, communication;

deficiencies in satellite coverage; vessel shortages(icebreaker and ice-capable LNG vessel)

Oil and Gas from Murmansk

State	through Suez Canal		through NSR		+/- days
Japan (p. Kobe)	12 291 miles	37,1 days	6010 miles	18,1 days	-19
Korea (p. Busan)	12266 miles	37 days	6097 miles	18,4 days	-18,6
China (p. Ningbo)	11848 miles	35,8 days	6577 miles	19,9 days	-15,9

China's Solutions to Hedging Seaborne Transportation Risks

- Cooperation with countries along the maritime routes

- Stick to the path of peaceful development
- Building stable relationship with major powers based on the principles of non-confrontation, non-conflict, mutual respect, cooperation and win-win
- Strengthening cooperation with countries along "one belt, one road"

China's Solutions to Hedging Seaborne Transportation Risks

- Actively taking antipiracy escort actions and related drills

  21 Chinese Task Forces have been sent to the Gulf of Aden since 26 December 2008. Until 15 August, 2015, the Chinese Task Forces have escorted 5900 ships(among which foreign vessels are the majority)

- Enhancing capacity of safeguarding SLOC

  The whitepaper in 2015 China's Military Strategy noted that Chinese armed forces are committed to the strategic mission of "protecting overseas interests and security" and "establishing a modern navy system to accommodate national security and development interests" with the aim to "secure strategic channels and overseas interests"

Conclusions

- Although energy consumption growth rate in China will be tempered by a slowing economic growth rate, China will inevitably continue to rely on imported energy, especially oil and gas.
- The diversification of energy supply will not fundamentally change China's dependence on maritime energy transportation.
- Security challenges of maritime energy transportation will persist for a long period, however, which should not be highly exaggerated.
- China lacks means and capabilities to comprehensively ensure its energy transportation security, cooperation with all other countries should be its realistic option.

Thank You