Global natural gas markets: Prospects for US exports?

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Outline

- Global natural gas
- How has the past year affected projections of global natural gas markets?
- Effects of lower prices
  - Will lower prices affect Australia's LNG exports?
  - Will lower prices affect US export opportunities?
- Shipping cost differentials
- Japan and nuclear re-start
- China's alternatives
- Summary

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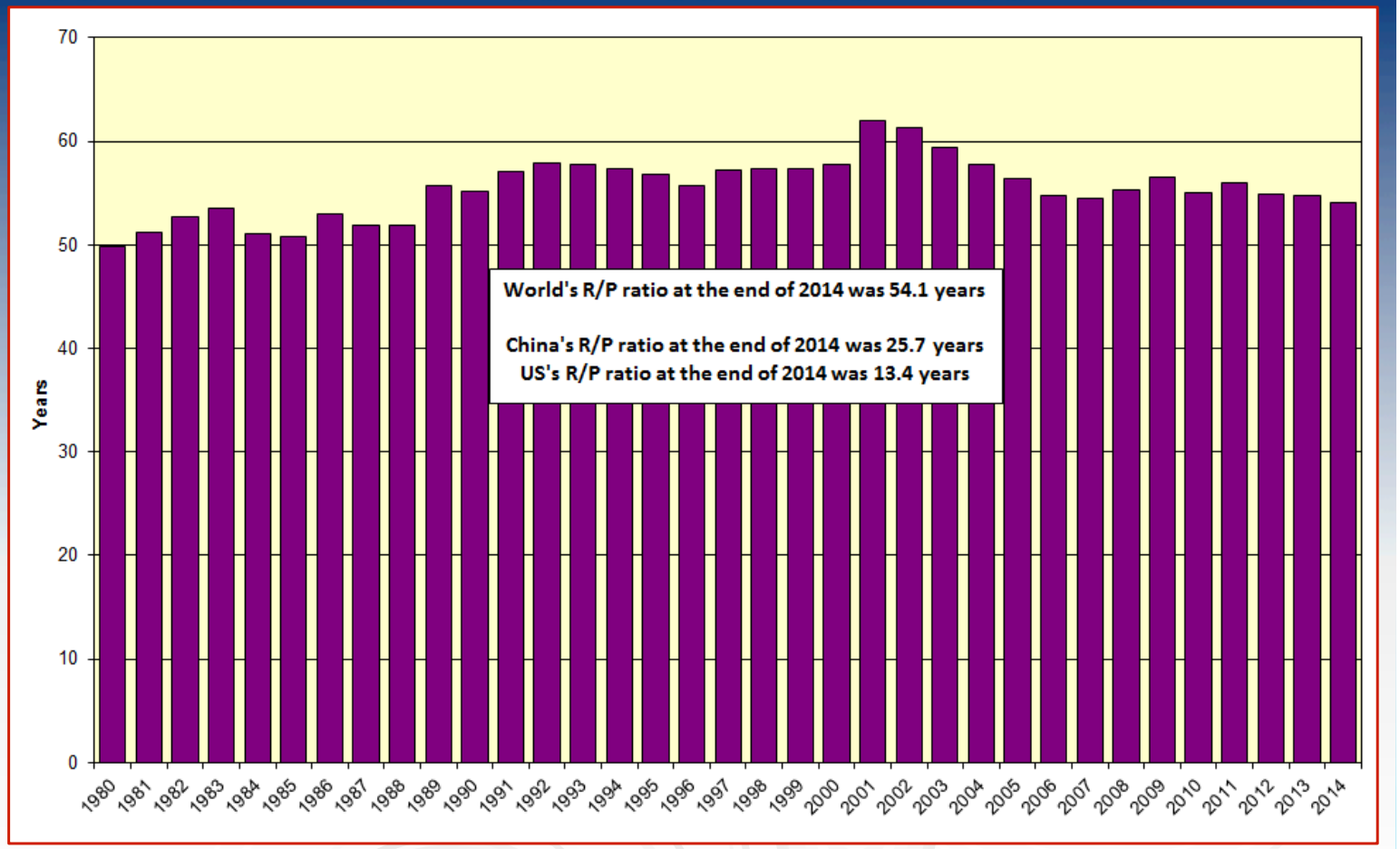
Global Natural Gas

World R/P ratio: 1980-2014

Source: BP Statistical Review of World Energy 2015



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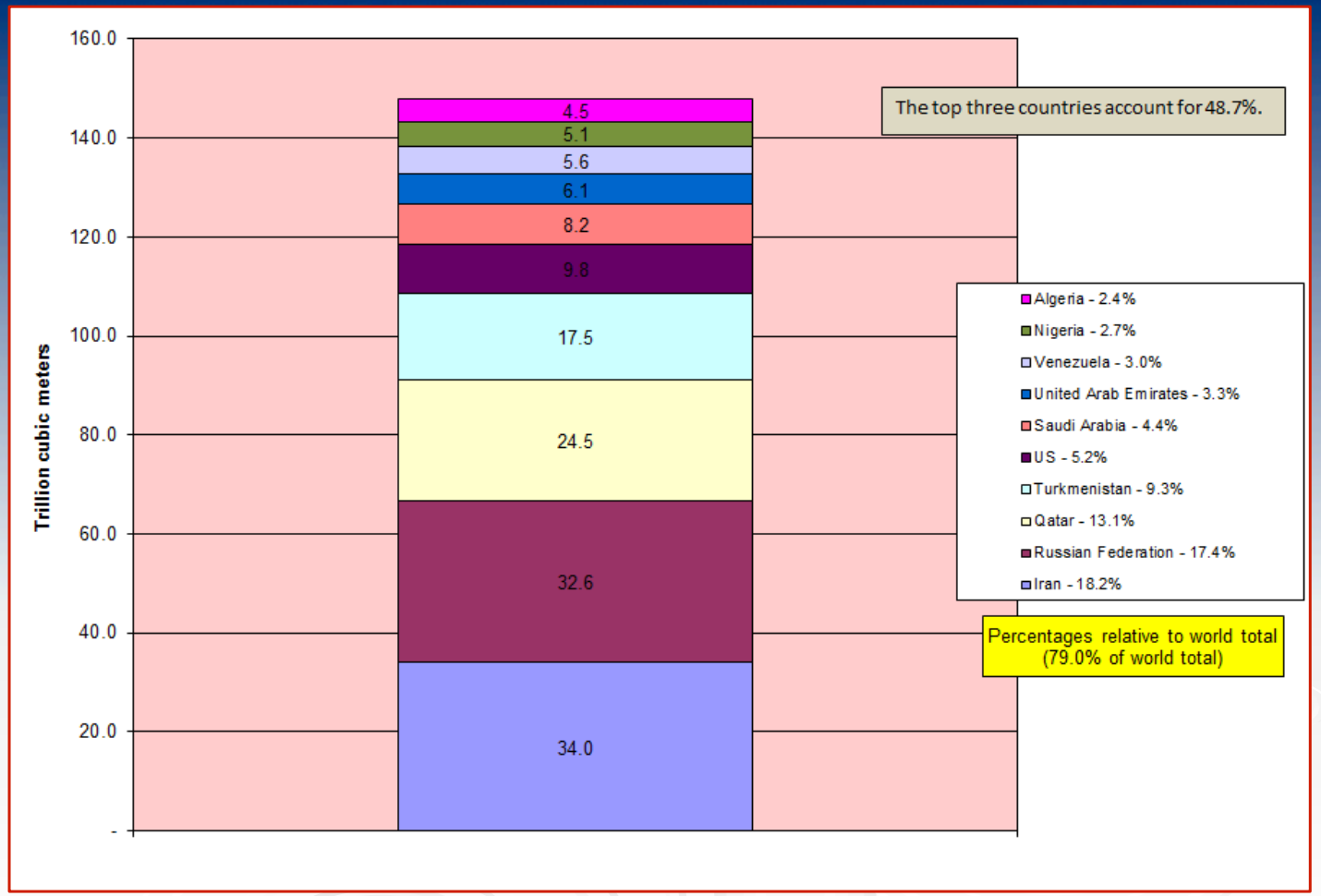
Top ten natural gas proved reserves

Source: BP Statistical Review of World Energy 2015



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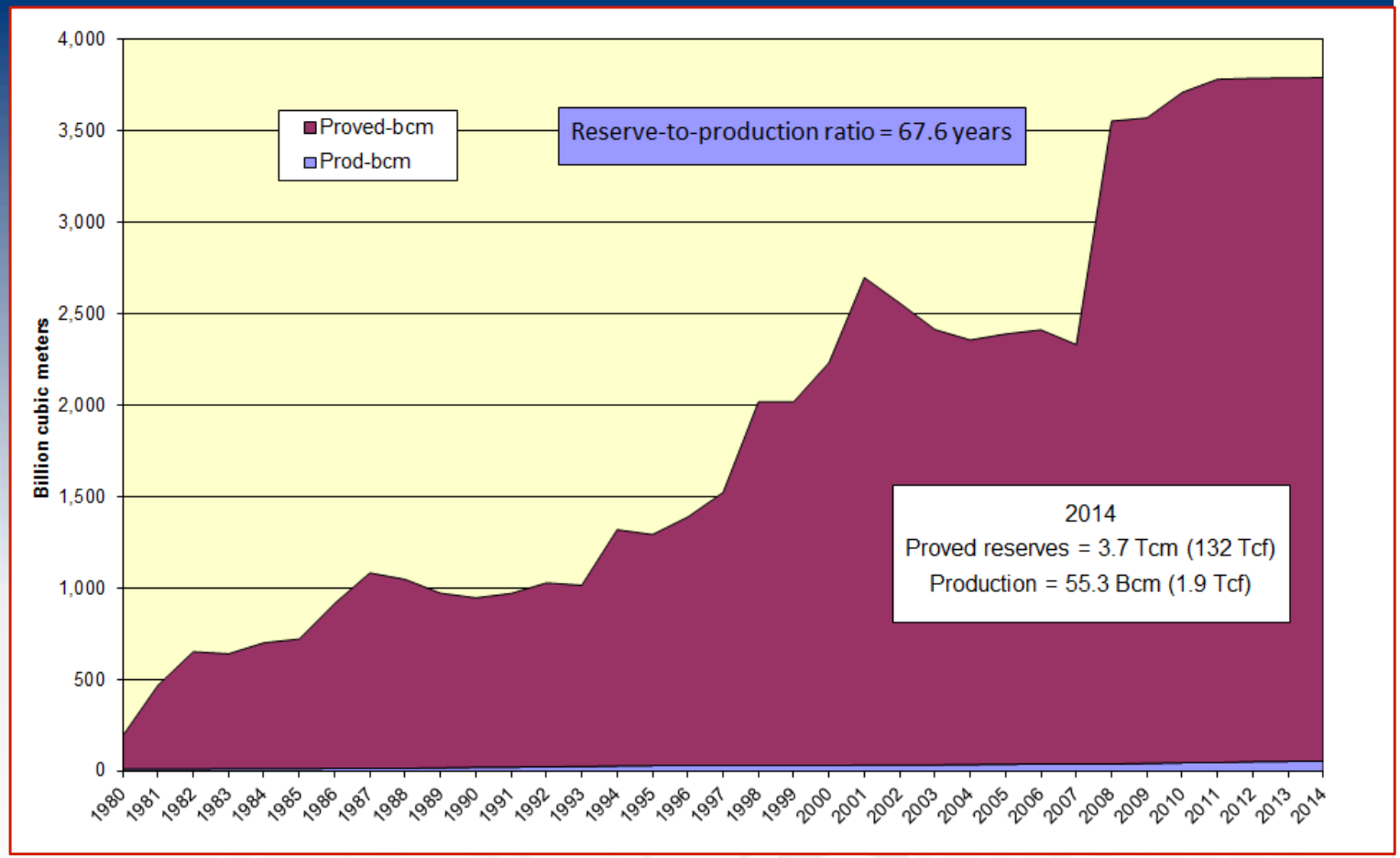
Australia proved reserves and production: 1980-2014

Source: BP Statistical Review of World Energy 2015



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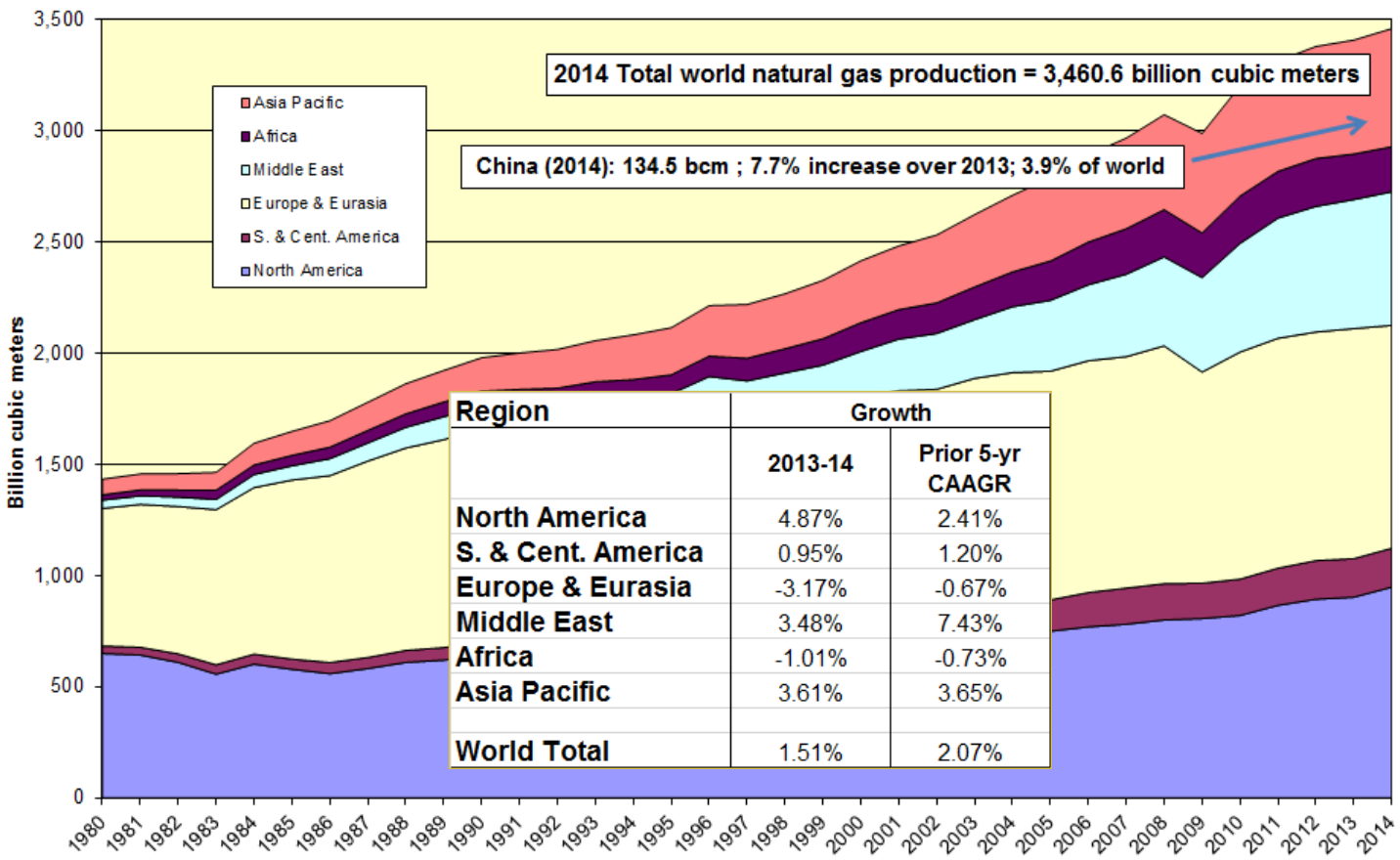
World production by region: 1980-2014

Source: BP Statistical Review of World Energy 2015



Region	Growth	
	2013-14	Prior 5-yr CAAGR
North America	4.87%	2.41%
S. & Cent. America	0.95%	1.20%
Europe & Eurasia	-3.17%	-0.67%
Middle East	3.48%	7.43%
Africa	-1.01%	-0.73%
Asia Pacific	3.61%	3.65%
World Total	1.51%	2.07%

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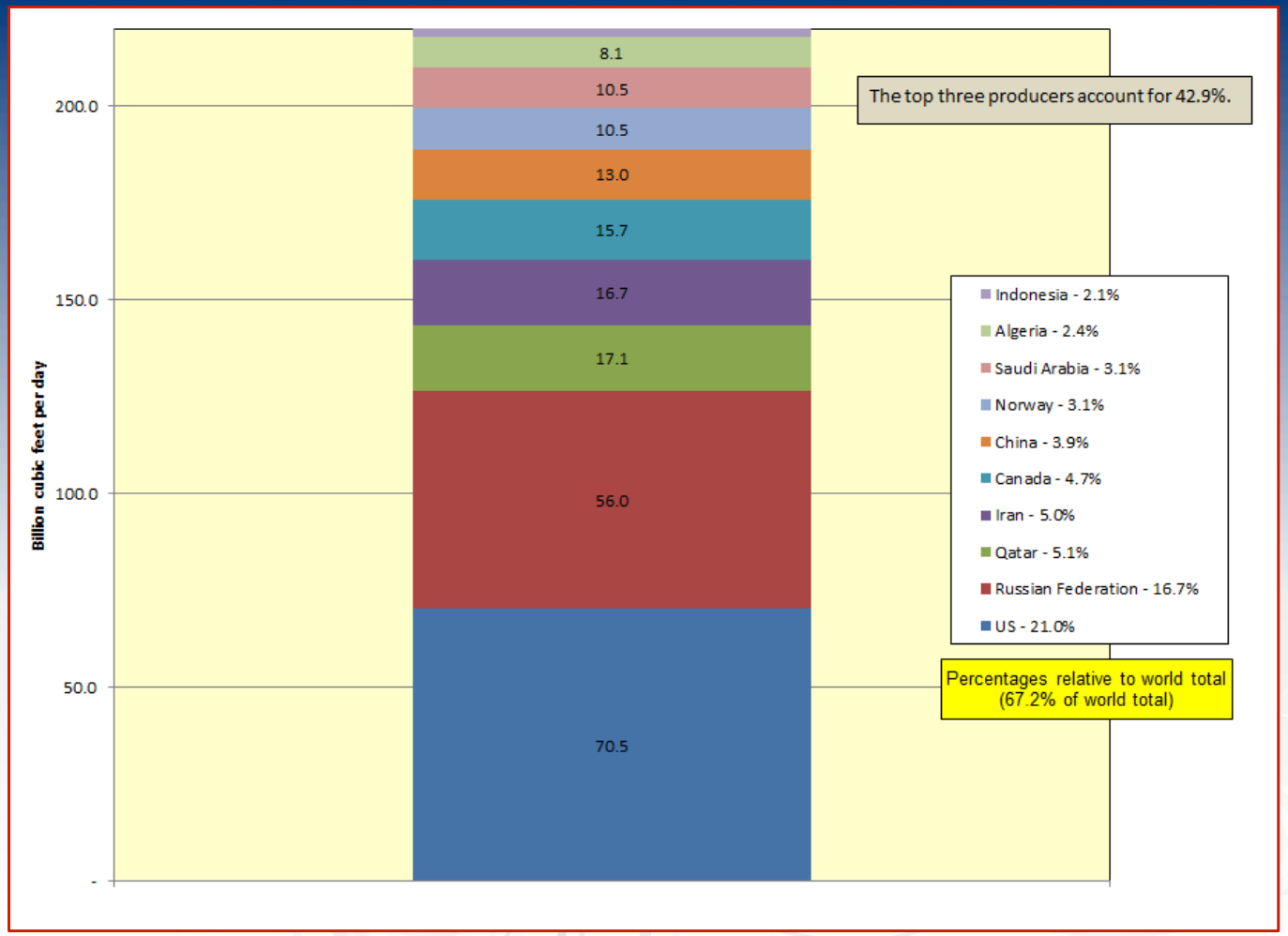
Top ten natural gas producers

Source: BP Statistical Review of World Energy 2015



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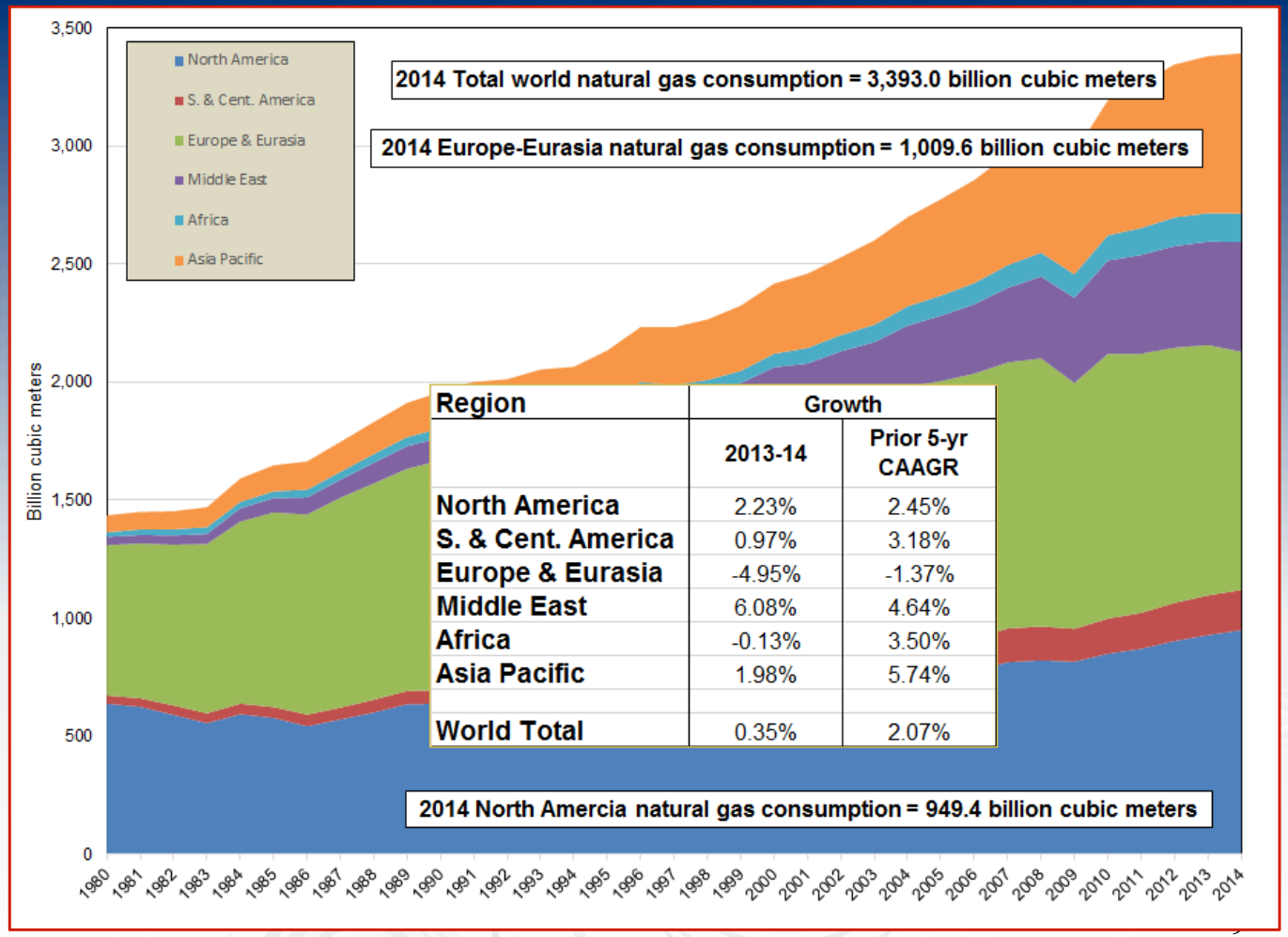
World consumption by region: 1980-2014

Source: BP Statistical Review of World Energy 2015



Region	Growth	
	2013-14	Prior 5-yr CAAGR
North America	2.23%	2.45%
S. & Cent. America	0.97%	3.18%
Europe & Eurasia	-4.95%	-1.37%
Middle East	6.08%	4.64%
Africa	-0.13%	3.50%
Asia Pacific	1.98%	5.74%
World Total	0.35%	2.07%

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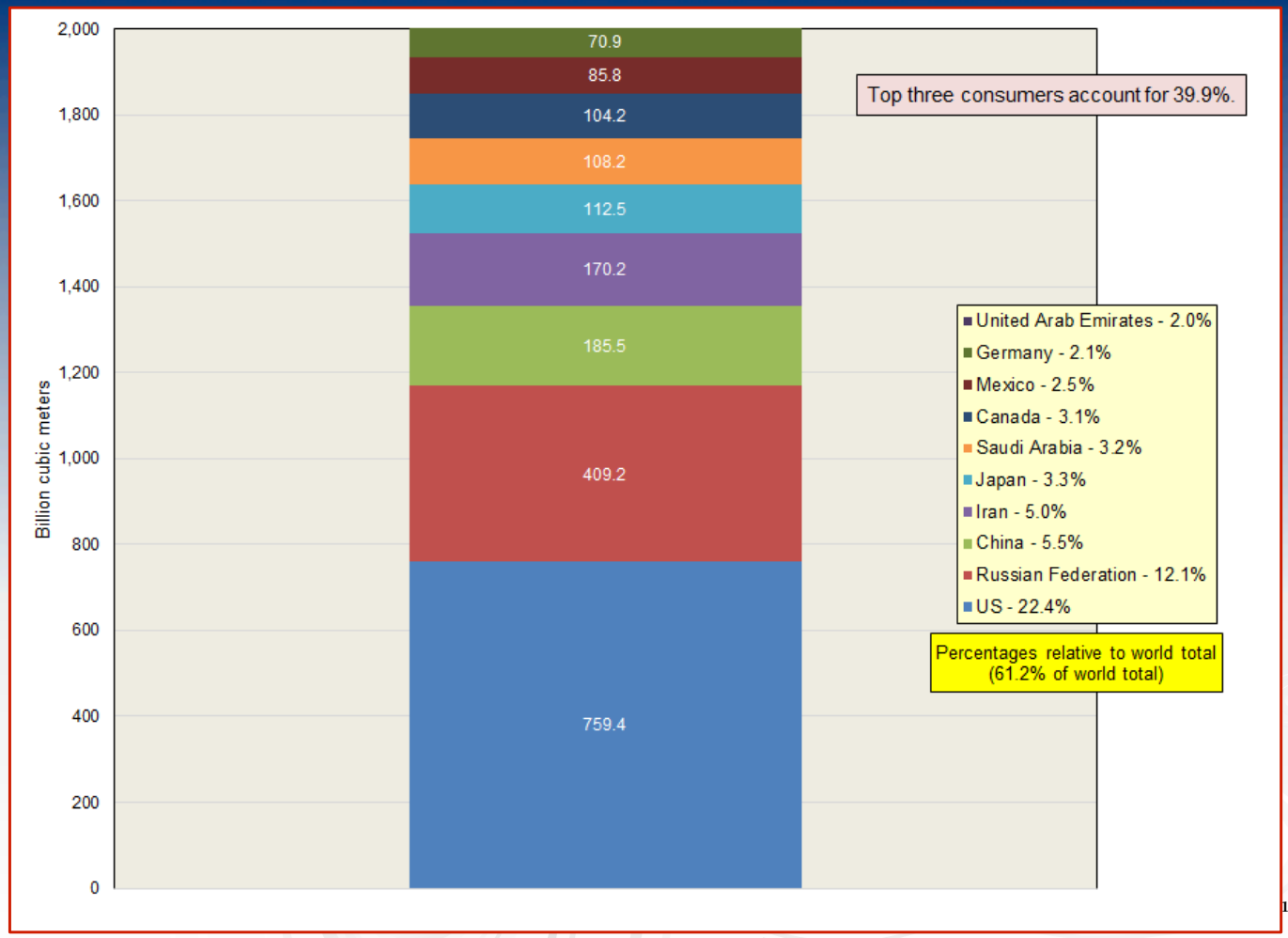
Top ten natural gas consumers

Source: BP Statistical Review of World Energy 2015



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Altered projections: What a difference a year makes

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Projected regional production and consumption

Region (Bcf/d)	2013	2015	2020	2025	2030	2035	2013-2035 growth
North America	87.8	93.4	107.9	119.6	129.4	137.4	0.56
S & C America	17.0	17.3	19.0	20.4	21.4	22.7	0.33
Europe & Eurasia	99.8	100.0	103.2	112.7	114.0	116.2	0.16
Middle East	54.9	60.6	72.0	78.8	84.8	89.3	0.63
Africa	19.7	21.8	24.2	27.8	39.4	43.5	1.20
Asia Pacific	47.3	54.9	66.7	67.1	70.5	81.4	0.72
Total Natural Gas Production	**326.6**	**348.1**	**393.0**	**426.5**	**459.5**	**490.4**	**0.50**

Region (Bcf/d)	2013	2015	2020	2025	2030	2035	2013-2035 growth
North America	90.1	92.9	99.8	106.1	111.5	119.4	0.33
S & C America	16.3	16.5	19.2	21.0	23.1	25.1	0.54
Europe & Eurasia	102.9	102.4	108.2	112.9	117.3	121.0	0.18
Middle East	41.4	47.5	57.6	64.3	70.0	77.3	0.87
Africa	11.9	13.7	15.6	17.7	21.3	24.0	1.01
Asia Pacific	61.8	72.0	91.1	103.8	113.1	122.6	0.99
Total Natural Gas Consumption	**324.4**	**345.1**	**391.4**	**425.8**	**456.3**	**489.5**	**0.51**

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Source: BP Energy Outlook to 2035, Feb. 2015. Author conversion from Mtoe to Bcf/d

Implications for trade

Projected regional production minus consumption "gap": BP2014 and BP2015 difference

Region "Gap" (BP-2015) Bcf/d	2015	2020	2025	2030	2035
North America	0.47	8.14	13.55	17.91	18.00
S & C America	0.80	-0.16	-0.54	-1.75	-2.48
Europe & Eurasia	-2.47	-5.01	-0.21	-3.29	-4.86
Middle East	13.09	14.47	14.54	14.79	12.01
Africa	8.17	8.58	10.07	18.11	19.54
Asia Pacific	-17.10	-24.41	-36.69	-42.55	-41.23
Total Natural Gas	2.96	1.61	0.72	3.22	0.97
Region "Gap" (BP-2014) Bcf/d	**2015**	**2020**	**2025**	**2030**	**2035**
North America	-0.79	5.08	10.06	13.61	13.69
S & C America	1.09	0.63	-0.37	-1.49	-1.74
Europe & Eurasia	-1.87	-0.81	-0.49	-0.05	0.64
Middle East	15.51	15.40	14.88	14.19	14.07
Africa	9.02	9.66	13.11	17.99	20.89
Asia Pacific	-19.37	-23.18	-32.84	-42.86	-45.84
Total Natural Gas	3.60	6.78	4.35	1.39	1.71

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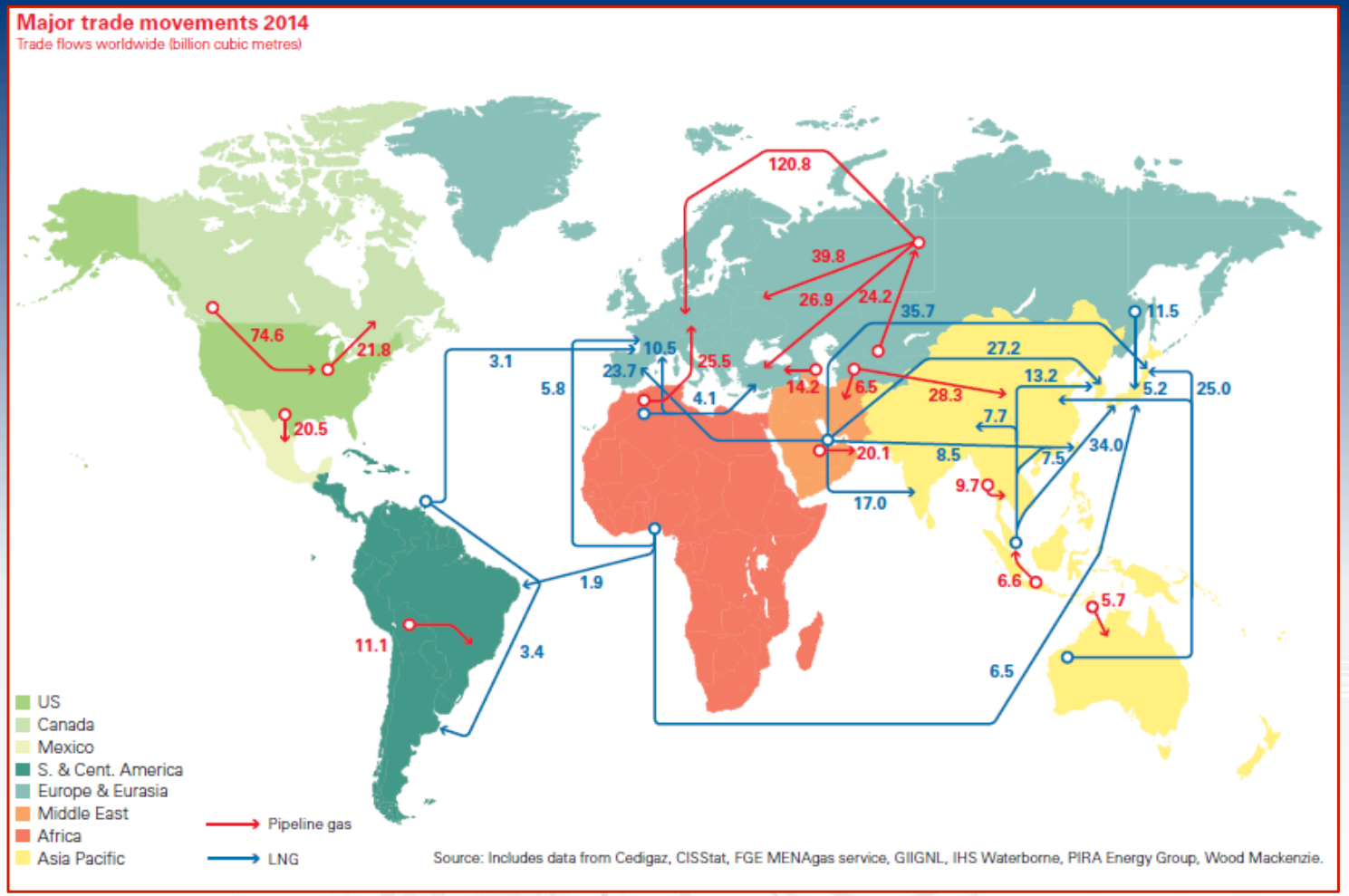
Source: BP Energy Outlook to 2035, Feb. 2015. Author conversion from Mtoe to Bcf/d



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Prices changes: Implications for US exports?

Price changes over the past year: implications for US exports to Asia

Month	Henry Hub spot	Japan spot arrival-basis	Arrival - HH	HH plus 15% plus $3.00 tolling	Shipping cost "allowance"
Apr-2014	4.66	18.3	13.6	8.36	9.9
May-2014	4.58	16.3	11.7	8.27	8.0
Jun-2014	4.59	15.0	10.4	8.28	6.7
Jul-2014	4.05	13.8	9.8	7.66	6.1
Aug-2014	3.91	12.5	8.6	7.50	5.0
Sep-2014	3.92	11.3	7.4	7.51	3.8
Oct-2014	3.78	12.4	8.6	7.35	5.1
Nov-2014	4.12	14.3	10.2	7.74	6.6
Dec-2014	3.48	15.1	11.6	7.00	8.1
Jan-2015	2.99	13.9	10.9	6.44	7.5
Feb-2015	2.87	10.7	7.8	6.30	4.4
Mar-2015	2.83	7.6	4.8	6.25	1.3
Apr-2015	2.61	7.9	5.3	6.00	1.9
% change	**-58.0%**	**-84.0%**	**-94.7%**	**-33.1%**	**-165.6%**

Sources: METI, Japan, EIA, and author calculations

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Global competition

Australia LNG

- Two things to remember
  - The incentive to ***invest*** requires an expectation of a return sufficient to cover full costs—fixed and variable.
  - The incentive to ***operate*** requires an expectation of a return sufficient to at least cover variable costs.
- Australia currently has four operating LNG facilities (28.45 mtpy)
  - North West Shelf—Western Australia (16.3 mtpy)
  - Darwin—Northern Territories (3.6 mtpy)
  - Pluto—Western Australia (4.3 mtpy)
  - QCLNG—Queensland (4.25 mtpy)
- And six under construction (53.2 mtpy), and several more "planned"
- A total of 81.65 mtpy expected by the end of 2016

Australia shipping advantage

LNG Carrier shipping cost comparison between XXX and YYY

140,000 m^3 tanker => ~ 2,995,000 MMBtu

Accounts for round trip, includes 2 additional days for loading and unloading, $35/nm fuel cost, and $0.20/MMBtu for Panama

						Day rate	
		Distance	Fuel	18 knots		$ 70,000	
Port-to-Port		nautical miles		Days	Hours	18 knots	Cost/MMBtu
Sabine	Zeebrugge	4861	$ 340,248	13	6	$ 1,855,000	$ 0.83
	Tokyo (S.Afr.)	15825	$ 1,107,755	38	14	$ 5,401,667	$ 2.47
	Tokyo (Panama)	9149	$ 640,440	23	4	$ 3,243,333	$ 1.67
Dampier	Tokyo	3762	$ 263,319	10	16	$ 1,493,333	$ 0.67

Sources: www.searates.com for distance and time, “Assessment of LNG transport chains using weather-based voyage simulations”, “Panama Canal Authority announced proposed LNG tolls”, and author calculations.

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LNG liquefaction capacity under construction

The 129 mtpy under construction represents an increase of over 43% from the current operating capacity of 298 mtpy, all meant to be operating by 2020.

		Capacity				
Country	**Project**	**Bcm/y**	**Bcf/d**	**Mtpy**	**Major stakeholders**	**Target online**
Indonesia	Donggi Senoro LNG	2.7	0.26	2.0	Mitsubishi, Pertamina, Kogas, Medco	2015
Indonesia	Sengkang	2.7	0.26	2.0	Energy World Corporation	2015
Columbia	Caribbean FLNG	0.7	0.07	0.5	Pacific Rubiales, Exmar	2015
Malaysia	MLNG Train 9	4.9	0.47	3.6	Petronas	2015
Australia	Gorgon LNG	21.2	2.05	15.6	Chevron, Shell, ExxonMobil	2015
Australia	Gladstone LNG	10.6	1.03	7.8	Santos, Petronas, Total, Kogas	2015
Australia	Australia Pacific LNG	12.2	1.18	9.0	ConocoPhillips, Origin, Sinopec	2015
Malaysia	PFLNG 1	1.6	0.15	1.2	Petronas, MISC	2016
United States	Sabine Pass LNG	24.5	2.37	18.0	Cheniere Energy	2016
Australia	Wheatstone	12.1	1.17	8.9	Chevron, Apache, KUFPEC	2016-17
Australia	Prelude FLNG	4.9	0.47	3.6	Shell, Inpex, Kogas	2016-17
Australia	Icthys	11.4	1.10	8.4	Inpex, Total	2017-18
Russia	Yamal LNG	22.4	2.17	16.5	Novatek, Total	2018+
Malaysia	PFLNG 2	2.1	0.20	1.5	Petronas, Murphy Oil Corporation	2018
United States	Cove Point LNG	7.1	0.69	5.2	Dominion	2018
United States	Cameron LNG	16.3	1.58	12.0	Sempra Energy	2018-19
United States	Freeport LNG	18.0	1.74	13.2	Freeport, Macquarie	2018-19
Total		**175.4**	**17.0**	**129.0**		

46% of this capacity is expected to be online by the end of 2016.

Source: IEA, 2015 Medium-term Natural Gas Report

Demand uncertainty

Japan's nuclear uncertainty

- Japan has been and remains the largest importer of LNG-based natural gas, importing 120 Bcm (89.2 mt of LNG) in 2014, accounting for 36% of global trade.
- All of Japan's nuclear capacity has been shut down since the Fukushima Daiichi disaster in 2011.
- Natural gas filled about 2/3 of the gap created by the shutdown.
- This increased demand for LNG-based natural gas by more than 25% between 2010 and 2014.
- Up to four (4) reactors could be back online by the end of 2015.
- The IEA (Medium-term Gas Market Report, 2015) assumes 10GW of capacity in operation by 2020, reducing natural gas demand by 10 Bcm, or about 7.4 mtpy of LNG production.

China's uncertainty and alternatives

- Projections of China's natural gas demand vary widely, ranging from as little as 198 Bcm in 2020 to 485 Bcm.
- One interpretation (mine) of BP's 2015 Energy Outlook to 2035 suggests 379 Bcm by 2020, and the IEA's Medium-term Gas Market Report suggests about 328 Bcm, while noting considerable uncertainty.
- China's first natural gas imports originated in Australia, and LNG imports have increased between 2010-2014 from 12.8 Bcm to 27.1 Bcm, sourced from 18 different countries.
- Pipeline imports between 2010-2014 grew from 3.55 Bcm to 31.3 Bcm, sourced from 4 different countries.
- And more LNG regasification and import pipeline capacity are forthcoming.

China's import capacity: operating, planned, under construction

Regasification - operating		
Terminal	**Capacity (Bcm/y)**	**Year**
Dalian	4.1	2011
Guangdong	9.2	2006
Dongguan	1.4	2013
Fujian	3.6	2008
Hainan	3.0	2014
Qingdao	4.2	2014
Rudong	4.8	2011
Shanghai	0.3	2008
Shanghai LNG	4.1	2009
Tangshan	4.8	2013
Tianjin	3.0	2013
Zhejiang	4.1	2012
Zhuhai	4.8	2013
Total operating	51.4	
Source: GIINGL		

Regasification - under construction		
Terminal	**Capacity (Bcm/y)**	**Year**
Beihai	3.0	2015
Diefu	4.0	2015
Jieyang	2.0	2015
Zhoushan	3.0	2017/18
Under construction	12.0	
Source: GIINGL		

LNG Regasification capacity – existing and planned

Natural gas pipelines – existing and planned

Table 6 Planned pipeline and import capacity

Pipeline	Capacity (Bcm)	Import (Bcm)	Main import sources	Operation (year)	length (km)
China-Myanmar pipeline	12	12	Myanmar	2013	1100
Center Asia pipeline A/B line	30	30	Turkmenistan, Kazakhstan	2011	3298
Center Asia pipeline C line	30	25	Uzbekistan	2015	1830
Center Asia pipeline D line	30	30	Turkmenistan	2016	1000
Power of Siberia pipeline (China-Russia east line)	38	35	Russia	2018	4000
Altai pipeline (China-Russia west line)	30	25	Russia	2016	1300

Data source: China National Petroleum Corporation

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Three Russian gas pathways

Source: IEA, Medium-term Gas Market Report, 2015

Summary

- Global natural gas has been affected by the evolution of the energy price environment.
- Asia-Pacific is expected to be in production-consumption deficit for the foreseeable future.
- Substantial supplies of natural gas from LNG and pipeline sources will be available, keeping downward pressure on prices.
- Australia maintains an advantage over the US for Asia-Pacific natural gas markets due to geographic location, large capacity, and sunk costs.
- At current relative prices, and expected LNG shipping costs, margins from the US to Asia are likely to be much slimmer than previously expected.
- Japan's nuclear re-start uncertainty clouds it's the level of demand.
- China's role as an LNG-based natural gas importer is unclear, with potential competition from pipeline imports and domestic production.

Thank you for the opportunity to speak with you!

Questions?

Comments?

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