



NATURAL GAS IN ASIA: The Challenges of Growth in China, India, Japan and Korea

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Tokyo, July 11, 2008



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- **Natural Gas Demand in Europe – the importance of power generation**, Anouk Honore
- **The New Security Environment for European Gas**, Jonathan Stern
- **US Natural Gas Prices: scenarios to 2015**, Michelle Foss
- **Gas-OPEC: a distraction from important issues of Russian gas supply to Europe**, Jonathan Stern
- **The Potential Contribution of Natural Gas to Sustainable Development in South Eastern Europe**, Aleksandar Kovacevic
- **Is there a rationale for the continuing link to oil product prices in Continental European gas contracts?** Jonathan Stern
- **Ukraine's Gas Sector**, Simon Pirani
- **The Dolphin Gas Project**, Justin Dargin
- **Regulatory models and economic performances in the European gas market: A quantitative analysis**, Nadine Haase

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Research in Progress

- **CIS Gas Markets and Their Impact On Europe**, ed. Simon Pirani
- **European Gas Demand, Supply & Pricing: cycles, seasons and the impact of LNG price arbitrage**, Anouk Honore
- **A History of UK Gas Trading**, Patrick Heather
- **The Independent Gas Sector in Russia**, James Henderson
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- **German Gas Liberalisation: a post-2006 assessment**, Heiko Lohmann
- **New LNG Projects: what do IOCs have to offer?** David Ledesma
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- **The Influence of Gas Storage on Gas Price Volatility**, Markus Wachter
- **Is there a rationale for the continuing link to oil product prices in Continental European gas contracts**, 2nd Edition, Jonathan Stern



Natural Gas in Asia: OIES Presenters

Introduction: Jonathan Stern

THE MARKETS

China: Dr Keun Wook Paik

Korea: Dr Keun Wook Paik

India: Jonathan Stern

THE SUPPLIERS:

Middle East: Andy Flower

South East Asia/Australia: Andy Flower

Russia and Central Asia: Jonathan Stern

Conclusions: Jonathan Stern



Introduction: Natural Gas in Asia



What Questions Are We Seeking to Answer?

- Will natural gas assume a share in the energy balances of China, India, Japan and Korea by 2020 equivalent to other OECD countries around 20%?
- If not why not?
- What has changed in our perceptions of natural gas futures in these countries over the past 5 years?

I will return to these questions in the presentation of the conclusions



Changed Context for Asian gas in 2008 Compared with 2002

- **GDP growth 6-10%pa; rising energy demand**
- **much higher energy/gas prices and project costs**
- **Emergence of China and India as competitors in Pacific/global LNG markets**
- **Tightness of LNG supply/demand with very high spot prices**
- **Heightened concern about security of supply, meaning availability of sufficient gas/LNG to meet anticipated demand**

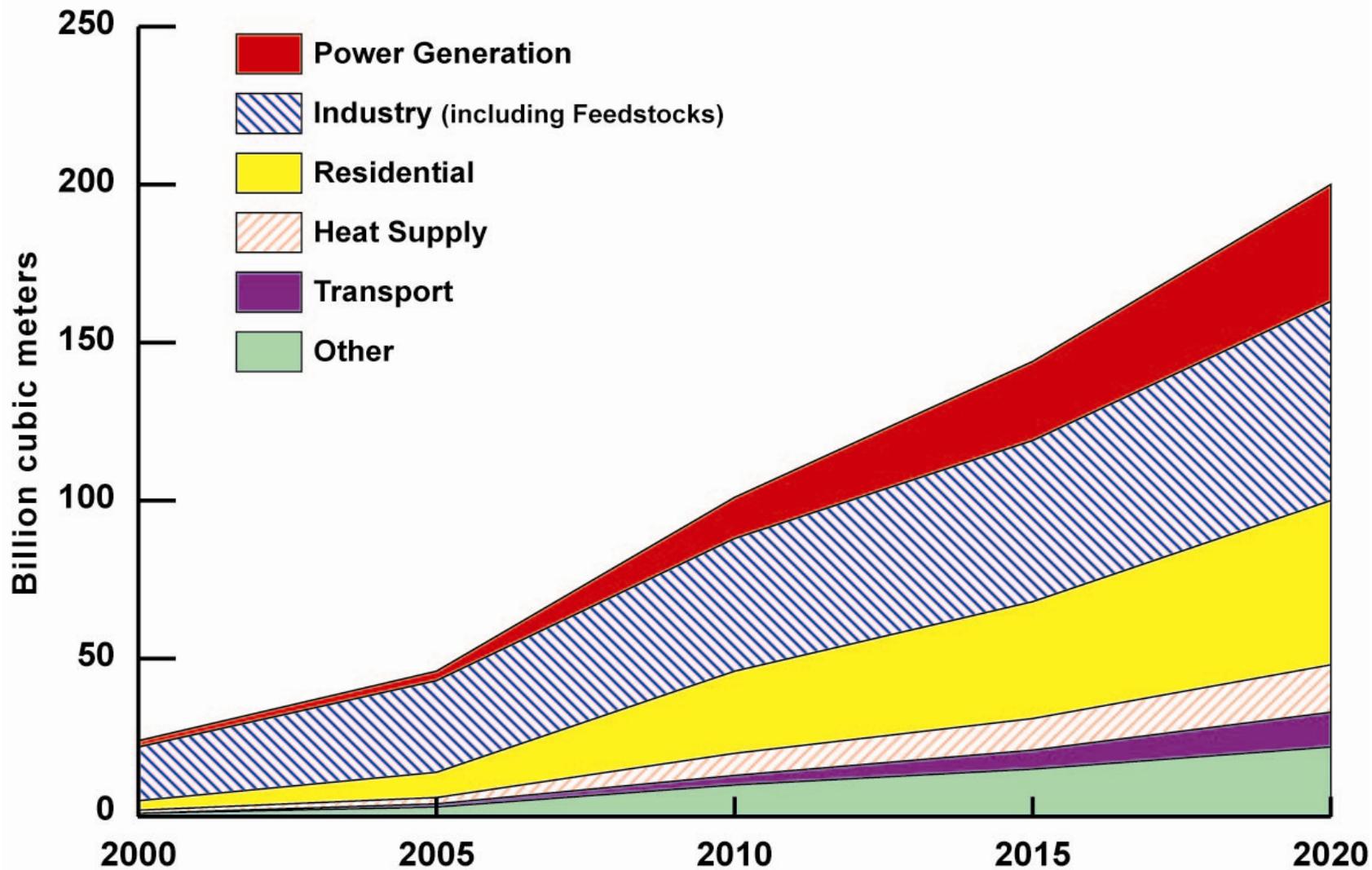
**Liberalisation has faded from the agenda,
but supply competition has increased**



Natural Gas in China



Structure of Chinese Gas Demand to 2020



Source: Fridley in Stern 2008





Gas Pipeline Development

In 2005, total pipeline 22,451 km, with 37.4 bcm/y capacity

1997, 1st Shaanxi-Beijing Pipeline, 3.6 bcm/y

2004, Chongqing-Wuhan Pipeline, 3.0 bcm/y, 780 km

2004, West-East Pipeline, 12.0 (17.0) bcm/y, 4,000 km

2005, Jingbian-Xian Pipeline, 2.5 bcm/y

2005, 2nd Shaanxi-Beijing Pipeline, 12.0 bcm, 780 km.



Summary and Conclusions

- China's gas expansion is set to continue. But domestic reserves are not big enough and massive imports inevitable. By 2020, around 200 bcm gas demand is very realistic and around 80 bcm of gas has to be covered by LNG or pipeline gas.
- The role of gas for power is compromised by the price burden, and China is set to increase the dependence on coal use for power generation.
- The second gas pipeline will play an important role for China's gas expansion but the third gas pipeline is subject to the price negotiation between Russia and China.
- The delay of pipeline gas from Russia to China will force China's heavy dependence on LNG import and the consequence will be more competition for finding LNG supply sources.
- Gas in China's energy balance by 2020 is unlikely to reach to 10%.



Natural Gas in Korea



Summary and Conclusions

- Korea's gas expansion is set to slow down.
- Main trunk pipeline development is virtually completed but the storage build-up still requires a massive investment.
- Korea's gas supply and demand gap in 2011, 2015 and 2020 is projected to be 6-8 mt, 11-12 mt, and 22 mt respectively, based on the contracted volume.
- Korea had to pay a huge price for the delay of Russian gas supply to Korea by pipeline. The chance of Russian pipeline gas supply to the Korean Peninsula before 2018 is very slim. The same applies to Sakhalin 3 LNG.
- The most effective way to narrow the supply-demand gap is Korea's active participation in the upstream gas sector. A new entity Korea National Oil and Gas Corp (KNOGC), which is a holdings company of KNOC and Kogas will help the upstream opportunity development.



India

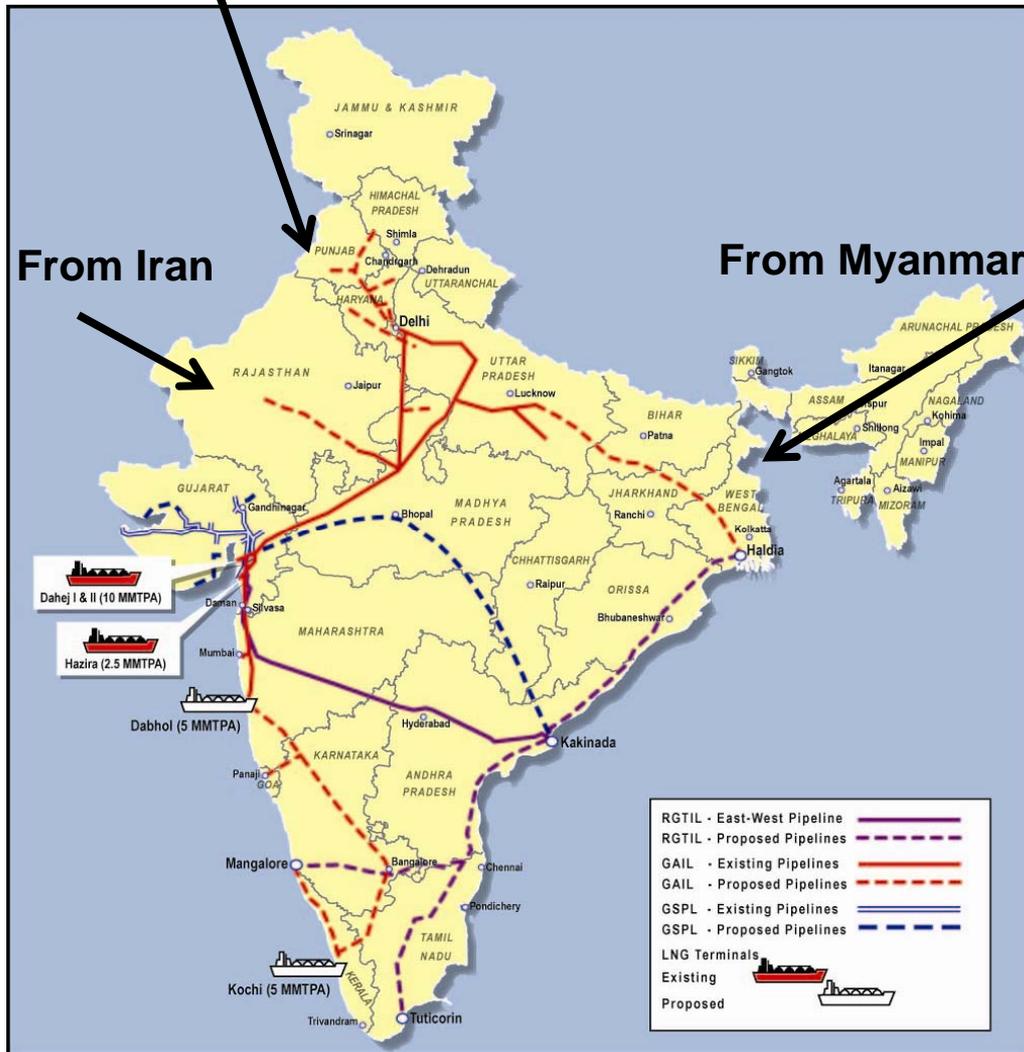


Fundamental Issues facing gas buyers in Asia

From Turkmenistan

From Iran

From Myanmar



- Gas import pipelines all have issues
- Gas transportation system is dominated by GAIL, skewed to the states in West and South (East rich in coal)
- New gas finds in the East means the pipeline network will double 2008-12
- LNG imports 11 Bcma (2007), expected to rise to 20 Bcm by 2015

Source: Natural Gas in Asia, OIES, 2nd Edition, May 2008



Conclusions

- **Growth of the gas sector is linked to:**
 - Pace of reform in the power sector, power shortages will drive change
 - Continuation of gas subsidies to the fertiliser sector
- **Increased domestic gas supply will result in**
 - lower LNG imports due to price competition
 - Reduced reliance on developing transnational gas pipelines
 - Development of new markets and drive rather than follow reform
- **Impact of higher oil/LNG prices may be to encourage domestic coal use**



Middle East

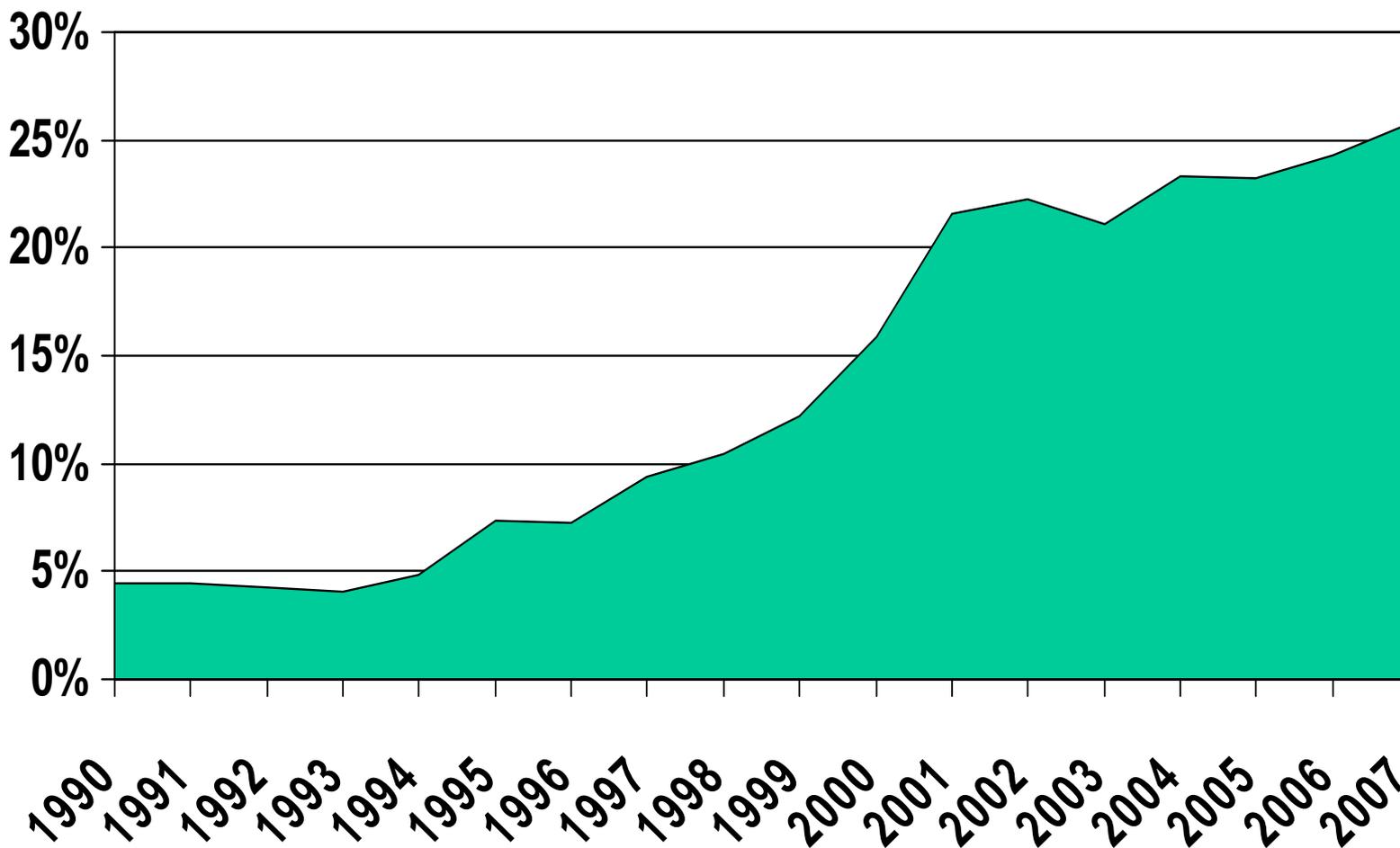


Middle East – LNG and Pipeline Infrastructure





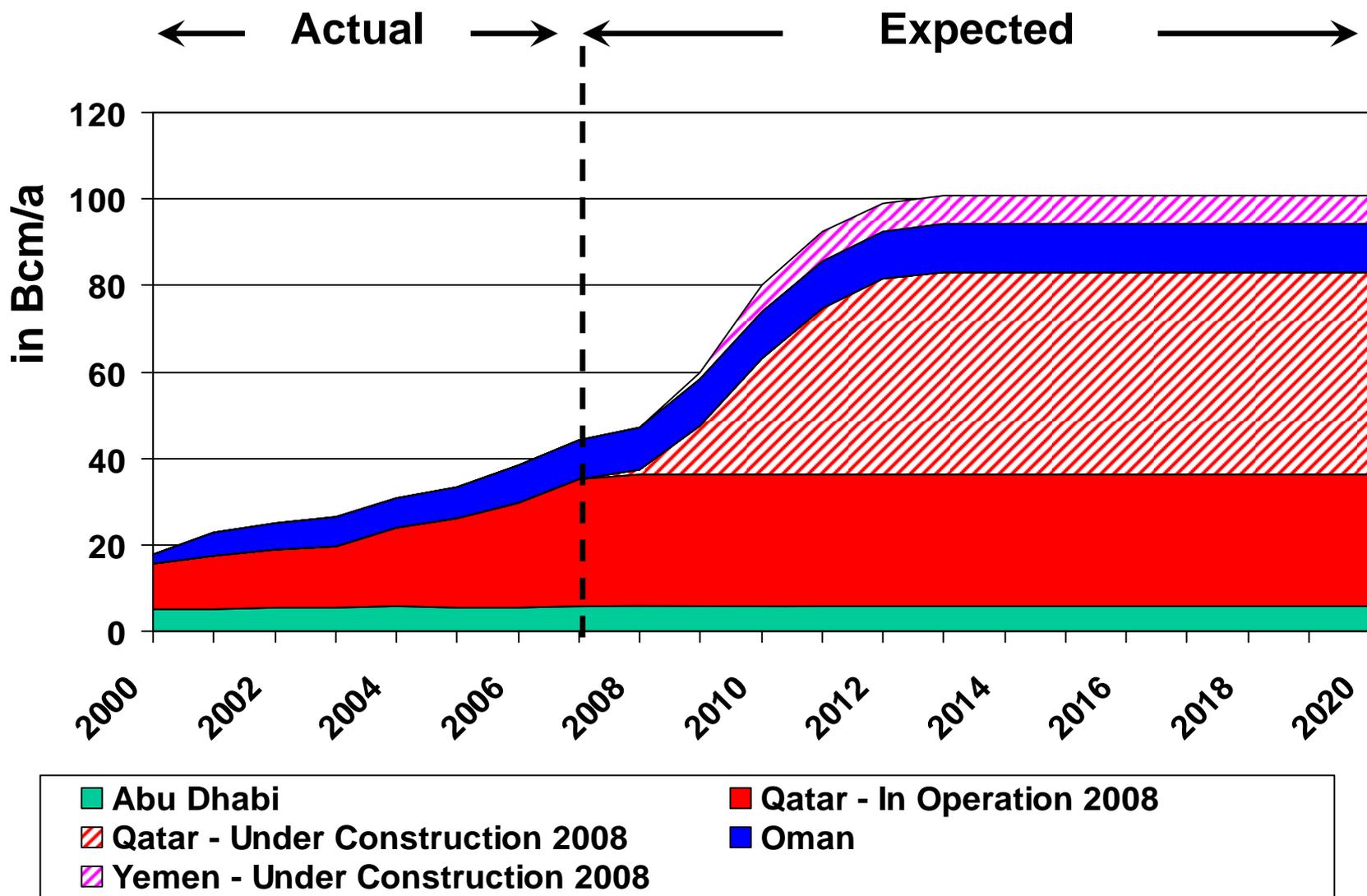
Middle East Share of Global LNG Production 1990-2007



Source: Author's Estimates and Cedigaz

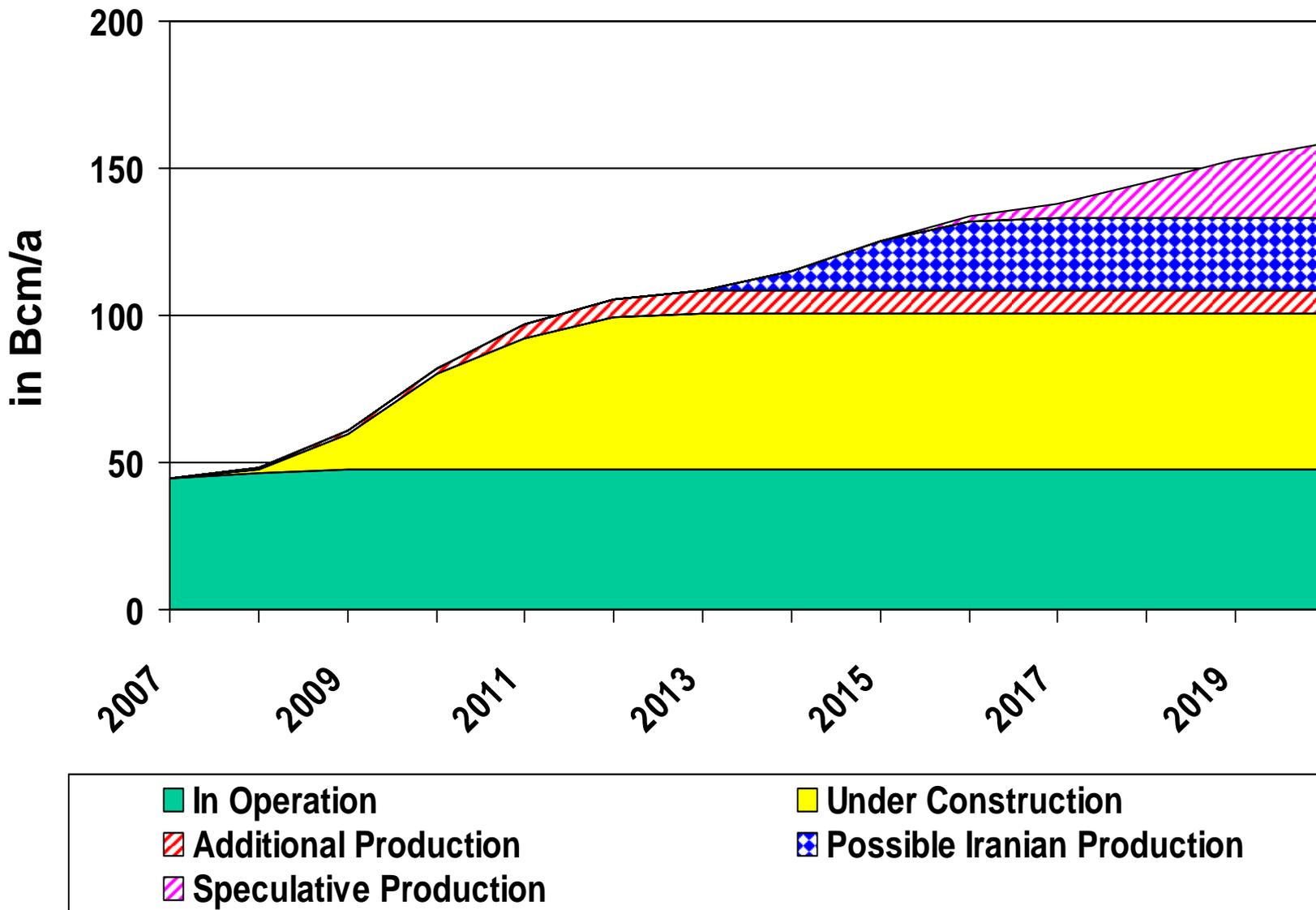


Middle Eastern LNG Production from Projects in Operation and Under Construction





Possible Middle Eastern LNG Production 2007-2020

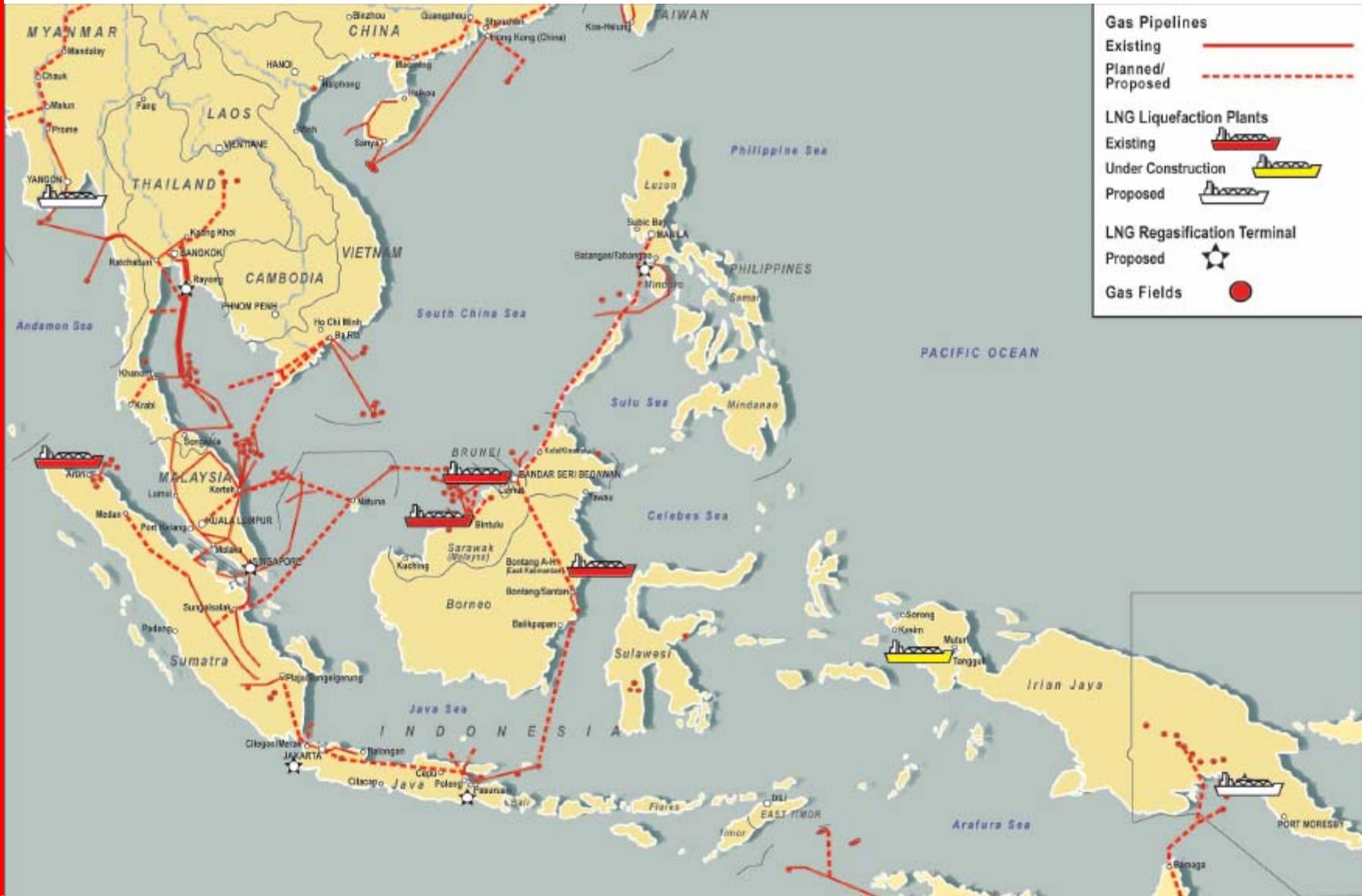




South East Asia and Australia



Diverse region with existing and new LNG supply, limited pipeline linkages. New gas supply through LNG not pipeline





Drivers of Asian LNG Supply

- Energy Policy Frameworks
- Resource availability
- Plant construction costs
- Atlantic Basin LNG demand
- Gas Prices
- Out of region supply

Drivers of Energy Policy



Source: Natural Gas in Asia, OIES, 2nd Edition, May 2008

- Will Asian gas supply countries keep gas for domestic use vs. export?
- Can new LNG be developed at economic levels?



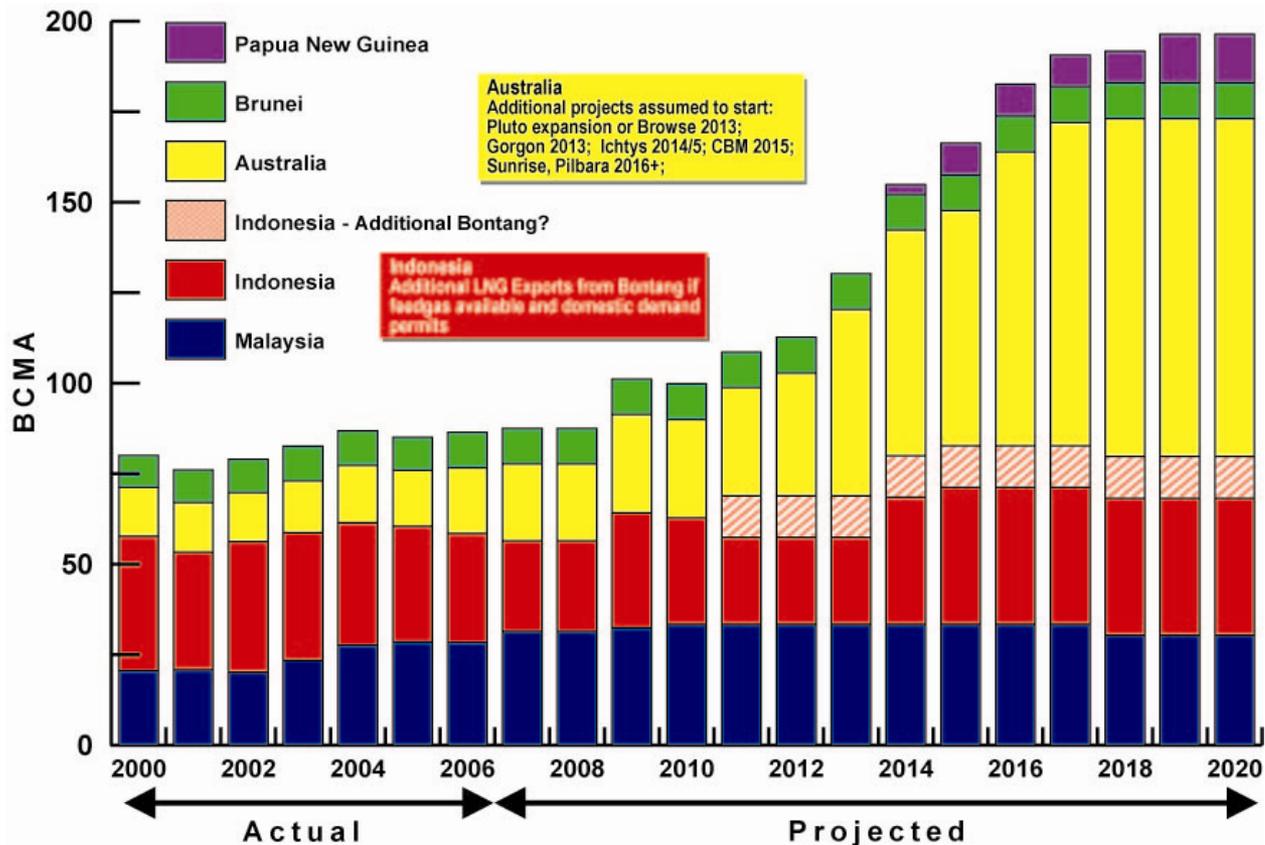
Australian LNG, Key to S.E. Asia LNG Growth



- 2007 exports 21 Bcm and expected to rise to nearly 100 Bcm by 2017
- New projects could be developed slower:
 - Shortage of human resources
 - Technical considerations (high CO₂)
 - Environmental factors



S.E. Asia LNG Supply is expected to rise to 200 BCM by 2020



Source: Natural Gas in Asia, OIES, 2nd Edition, May 2008

- **2007 S.E. Asia LNG supply 100 BCM**
– all stayed in the region
- **Can additional regional supply be delivered ?**



Russia and Central Asia



Russian Gas Exports to Asia: internal Russian politics 2002-08

- **Russian government gave Gazprom overall responsibility for coordination of all projects in eastern Russia BUT Gazprom was not involved in any of these projects**
- **This changed with Gazprom majority stake in both Sakhalin 2 and Kovykta**
- **Eastern Gas Programme shifts emphasis to domestic gas/economic development**

Russian government determination to “reclaim” assets from foreign companies and establish Gazprom as a national champion



Russia – China Gas Exports 2006-08

March 2006 Meeting between the presidents;
– MOU covering:

- **Altai (Western) Pipeline: from western Siberia (Bolshekhetskaya + Krasnoyarsk) linking with West-East Pipeline**
- **Eastern Pipeline taking gas from:**
 - **Kovykta – Russia Petroleum**
 - **Sakha region - Chayandinskoye – Gazprom (Rosneft?) Sakhaneftegaz**
 - **Sakhalin (Gazprom opposes ExxonMobil's 2004 contract with CNPC)**

Gazprom's September 2007 Eastern Gas Programme eliminates Kovykta as a source of exports – no progress



Eastern Gas Programme: export infrastructure



Stalled Gazprom-CNPC negotiations means no pipeline gas exports before late 2010s



Russian Gas Exports to Asia: summary

- **Kovykta:**
 - exports ruled out by Gazprom; local use and possible UGSS link
- **Chayanda:**
 - transferred to Gazprom ownership in May 2008
 - plan to start production at the field by 2016 for local use; possible exports thereafter
- **Sakhalin:**
 - 1: big fight with Exxon-Mobil continues
 - 2: LNG deliveries to start early 2009
 - 3: (part) transferred to Gazprom ownership in May 2008; could be used for LNG or PNG

No sense of urgency on Gazprom's part



Central Asian Pipelines to China

KAZAKHSTAN:

- Feasibility study for a gas pipeline parallel to the oil pipeline is under way

TURKMENISTAN:

- April 2006 Agreement between President Niyazov and Premier Hu Jintao
- 30/year Bcm to be purchased for 30 years starting in 2009(?)
- Prices will be a “comparable, international market price”

1000-2000k to the Chinese border, let alone from the border to markets; cost will be considerable – construction has started



Russia and Central Asia: conclusions

CONTRARY TO EXPECTATIONS OF 2000-06:

- Central Asian pipeline gas to China will commence in the next 2-3 years
- No Russian pipeline gas projects to China, Korea or Japan look likely before 2020
- Altai pipeline can only be realised with a 3rd West-East Pipeline
- Pipeline gas from Chayanda or Sakhalin 3 to either China or Korea is still possible before 2020 but would need much greater urgency from Moscow

LNG exports – Sakhalin 2 expansion – currently more likely than pipeline exports



Conclusions: gas in Asia up to 2020: what are the challenges of growth?



ASIAN GAS DEMAND (Bcm)

	2007		2020 proj	
	Demand	%PED*	Demand	%PED*
Japan	90.2	15.7	101-116	18-20
Korea	37.0	14.2	50-55	16-17
China	67.3	3.3	200	7-8
India	40.2	9.0	82	10-12
TOTAL	234.7		433-453	

*primary energy demand

Source: Stern 2008

- Demand nearly doubles by 2020 but share of primary energy demand increases moderately
- Gas has little impact on coal use or CO2 emissions in China or India



ASIAN GAS IMPORTS (Bcm)

	2007		2020 proj	
	Pipeline	LNG	Pipeline	LNG
Japan	0	88.8	0	100-115
Korea	0	34.4	0	50-55
China	0	3.9	30	50-100
India	0	10.0	0	20
TOTAL	0	137.1	30	220-290

Source: Stern 2008

- Asian LNG Imports will double by 2020.
- China could become as big an importer as Japan and is the major new Pacific market.



Asia Remains Largely an LNG Market

- **ASEAN has successful pipeline trade but with limited growth potential**
- **Russian pipelines to China, Korea and Japan – despite ample commercial justification – have made no substantial progress**
- **Pipelines from Turkmenistan and Iran to India (and elsewhere in Asia) are unlikely to make much immediate progress**
- **The only pipeline connection definitely going ahead is Turkmenistan/Kazakhstan to China; Myanmar-China is also likely**

Reasons for lack of success are largely political – for international and internal (price) reasons – there is still time to achieve results before 2020 (but not much)



Challenges to Growth: supply

From where will Asia source its large scale additional* gas supplies:

- Australia, Russia – Sakhalin and Chayanda (Kovykta?)
- Will there be additional supplies from: Iran, Qatar, Indonesia?
- Can long distance international pipelines, especially from Russia, be implemented prior to 2020? And if not....
- Is the future of gas in Asia increasing competition for limited supplies of LNG: between Asia-Pacific buyers, between Pacific and Atlantic buyers?

*ie additional to already signed contracts



Answers to Questions

Q1: Will natural gas assume a greater share in the energy balances of China, India, Japan and Korea by 2020 equivalent to other OECD countries around 20%?

A1: No, but Japan will come close

Q2: If not why not?

A2: Principally due to lack of pipeline development, both domestically and internationally

Q3: What has changed in our perceptions of natural gas futures in these countries over the past 5 years?

A3: Changes in general economic and energy price outlook can fundamentally change the current and future perceptions about gas; even five years is a long time to look ahead!