

“UNCONVENTIONAL GAS: CHALLENGES AND OPPORTUNITIES”

By:

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Datuk (Dr.) Abdul Rahim Hashim

Datuk (Dr.) Abdul Rahim Hashim, currently President, International Gas Union for the triennium 2009–2010, has held a number of high-profile positions of increasing responsibility, including Managing Director & Chief Executive Officer of Petronas Oil Refinery (Melaka) Sdn Bhd and Managing Director & Chief Executive Officer of Malaysian Refining Company Sdn Bhd (MRC). In his career path in higher management at Petronas, Dr. Rahim held the positions of Vice-President of Human Resource Management, Vice President for Gas Business, and Vice President of the Research & Technology Division of Petronas, the post he held until end of 2008. He also held several key positions in a variety of gas industry organizations, both in Malaysia and at an international level including helping the presidency of the Asia Pacific Natural Gas Vehicle Association (ANGVA).



Abstract

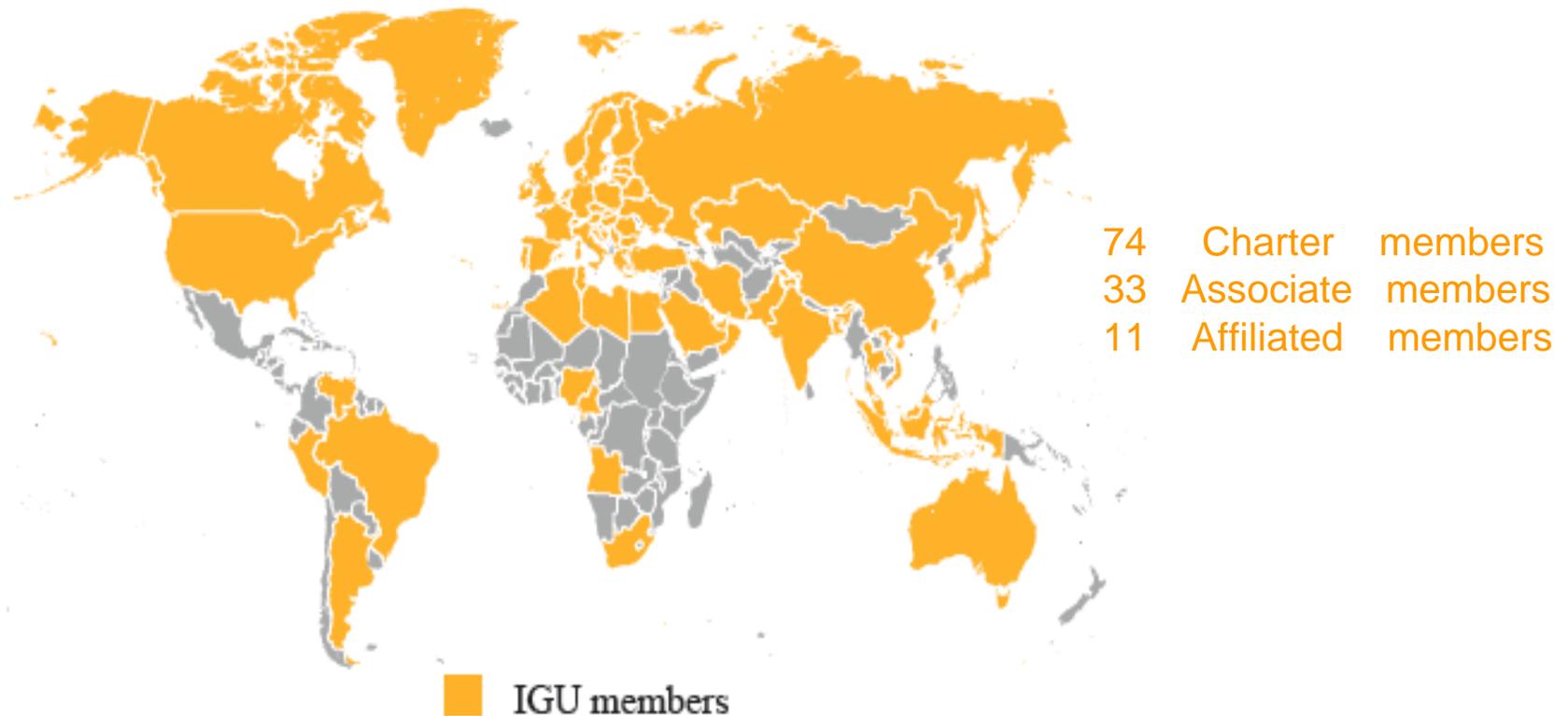
Many factors favor the continuing growth of the worldwide gas industry, notwithstanding the recent global financial crisis and economic slowdown. These include growing world population, enhanced urbanization, increased focus on climate change mitigation, and wider access to gas markets through LNG. The recent technological breakthrough in the development, production, and commercialization of unconventional gas in the U.S. created new dynamics in the global gas and energy landscape. Coupled with the softening of energy and gas demand after the global economic slowdown, the “surplus” gas supply situation led to weakening of gas and LNG prices, making them more affordable. Abundant conventional and unconventional gas resources would pave the way for greater utilization of gas in the energy consuming sectors.

- 1. Introduction**
- 2. Global Natural Gas and LNG Industry**
- 3. Unconventional Gas**
- 4. Key Challenges and Opportunities**
- 5. Closing Remarks**

IGU as **THE** spokesman for the gas industry

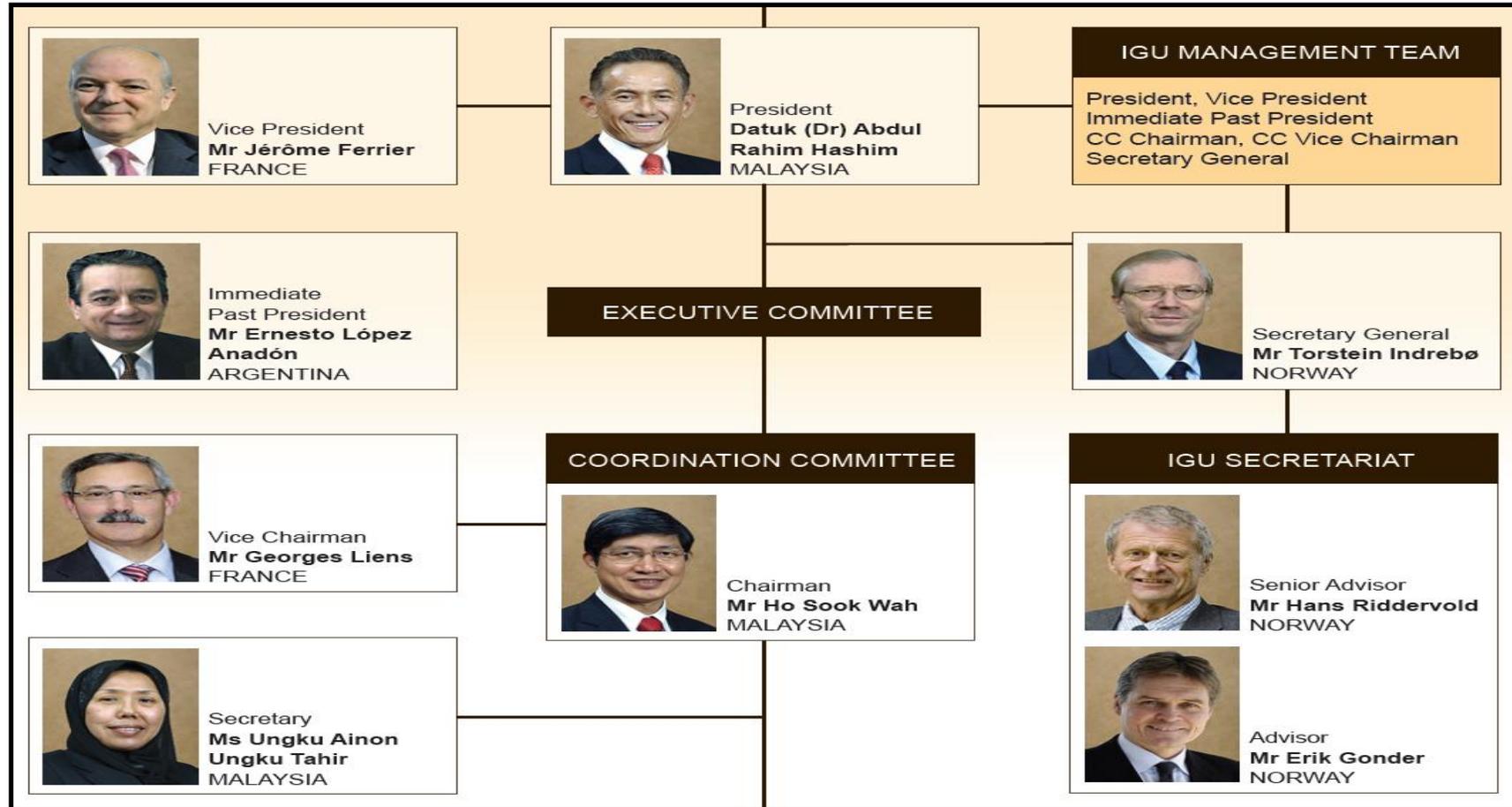
- Worldwide and non-profit organisation established in 1931
- Promotes technical and economic progress of the gas industry
- Emphasising sound environmental performance worldwide
- Increased focus on strategic and policy issues
- Cooperation with IEA, United Nations, World Bank, IEF and others

IGU Members responsible for 95% of Global Gas Sales



*N.B.: As of April 2010

IGU Organisation Chart for the 2009 – 2012 Malaysian Triennium



IGU is creating arenas for Networking – Knowledge – Dialogue

IGU World Gas Conferences (WGCs)

- 24th WGC - Buenos Aires, Argentina, 5-9 Oct. 2009
- 25th WGC - Kuala Lumpur, Malaysia, 4-8 June, 2012
- 26th WGC - Paris, France, 2015



Co-sponsor of LNG Conferences LNG 16 in Oran, Algeria, April 2010



Ministerial Gas Forums

- 1st IEF – IGU Ministerial Gas Forum 2008, Vienna
- 2nd IEF – IGU Ministerial Gas Forum, Doha, November 2010

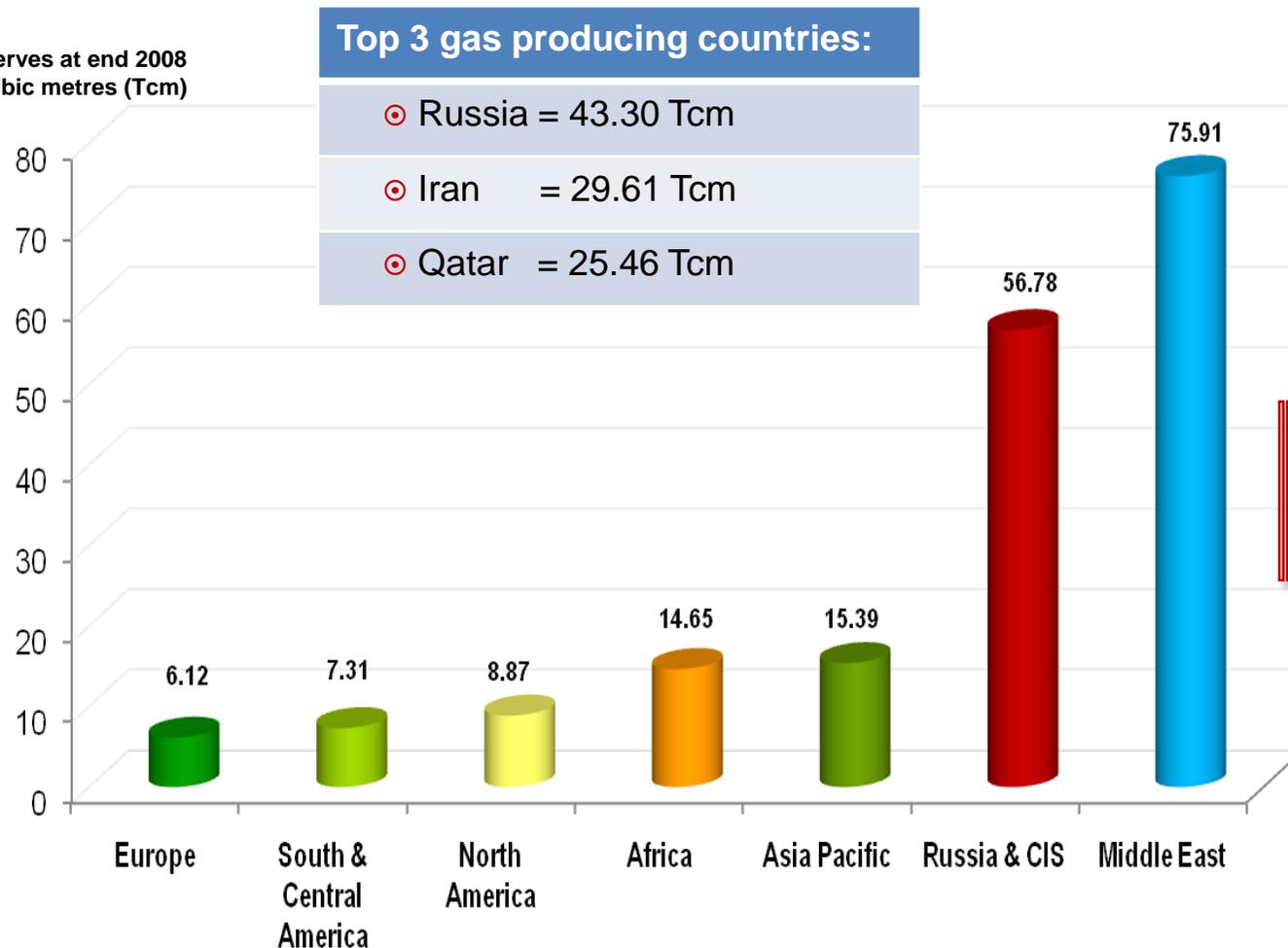
The IGU Research Conference

- IGRC 2011 in Seoul, Korea, October 2011



The world's proven natural gas reserves amounted to 185 Tcm

Proven gas reserves at end 2008
Trillion cubic metres (Tcm)



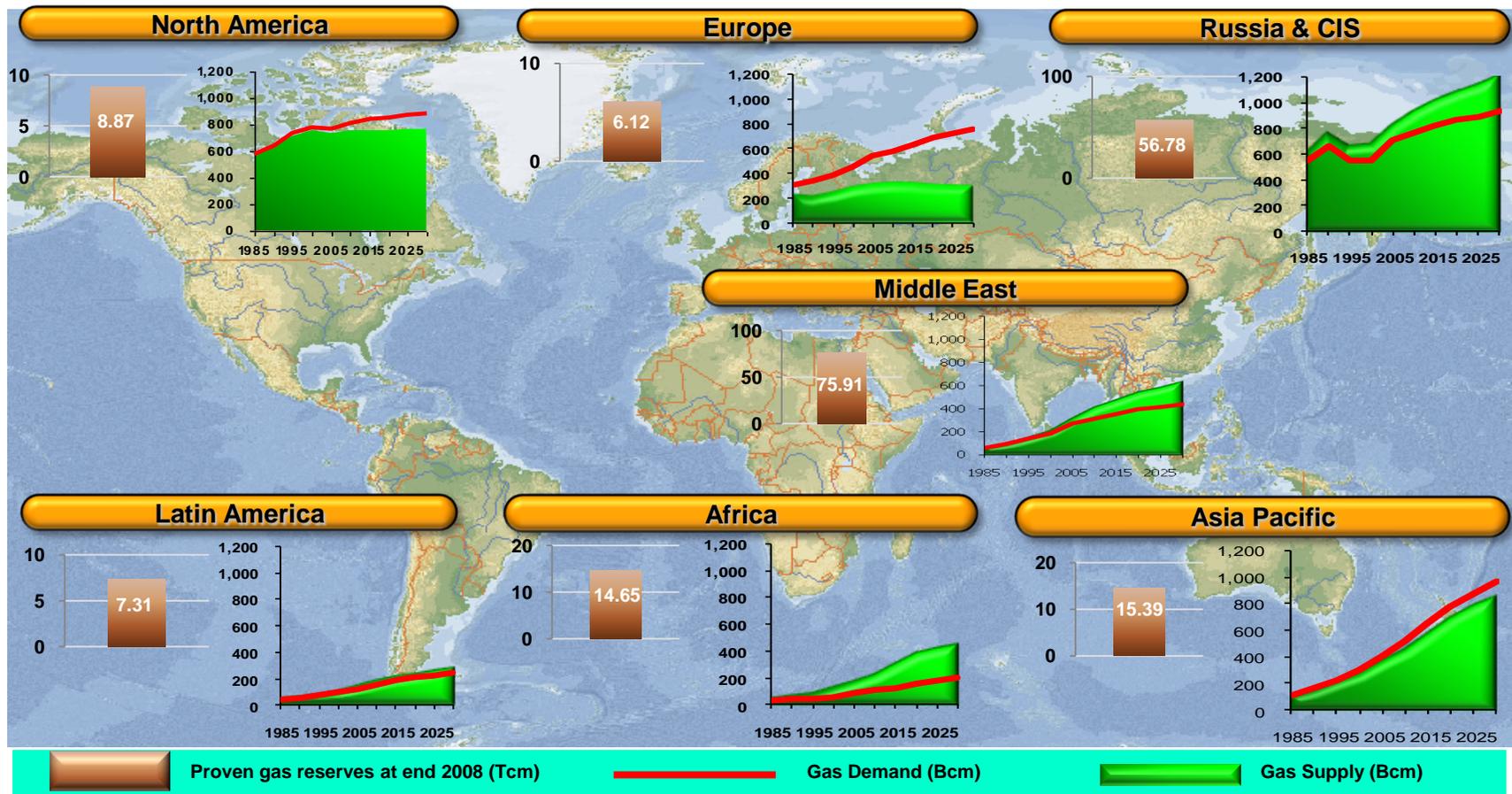
Top 3 gas producing countries:

- ⊙ Russia = 43.30 Tcm
- ⊙ Iran = 29.61 Tcm
- ⊙ Qatar = 25.46 Tcm

Total volume represents more than 60 years of consumption at today's rate

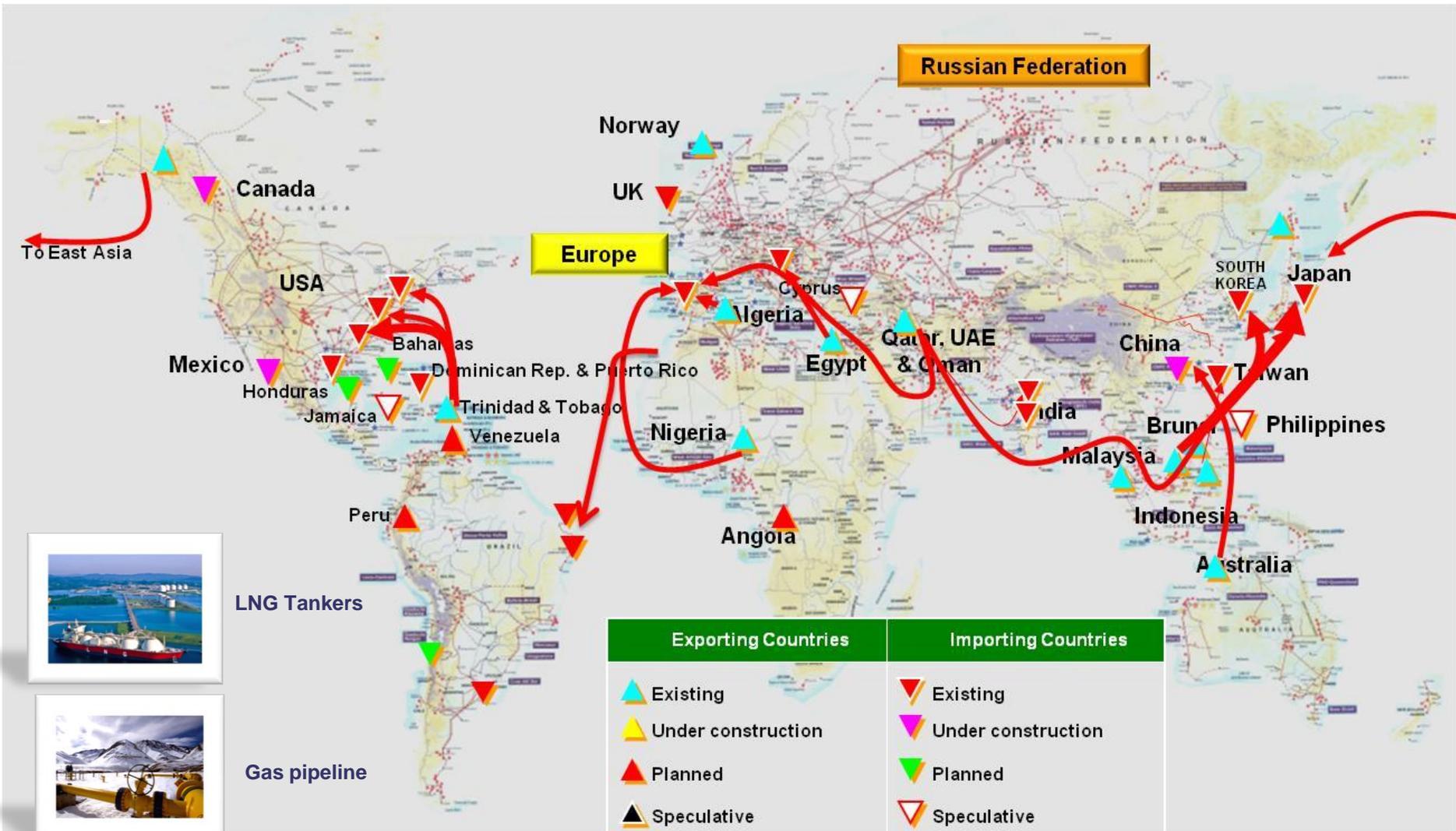
Overview on the world's supply vs. demand in the short & long term outlook

- Middle East, Russia & CIS and Africa emerge as key gas exporters
- Europe remains the largest net gas importer
- Asia – Pacific and Latin America are net gas importers
- North America has transformed itself to become a self-sufficient gas market



Source : OECD/IEA – 2009
 BP, " Statistical Review of World Energy", June 2009

Natural gas modes of transportation connecting the supply to demand centres



The outlook of unconventional gas prospects is highly promising



"The world is not running out of resources but we must look beyond conventional supplies" **Hamad Rashid Al Mohannadi**, Managing Director, RasGas

"This is a game changer, a paradigm shift. Shale gas makes the US the Saudi Arabia of natural gas" **Aubrey McClendon**, Chairman and CEO, Chesapeake Energy



"Increasing production from unconventional sources is offsetting declines in conventional plays" **Harold N. Kvisle**, President and CEO, TransCanada

"US doesn't need LNG." **Fereidun Fesharaki**, Chairman, FGEnergy on Shale gas development in the US



"Unconventional gas could add 250% to global gas reserves" **Daniel Yergin**, Head, IHS CERA

The magnitude of unconventional reserves changes any long term view on the industry

~ Antonio Brufau, Executive Chairman, YPF Repsol

"..resources are far more plentiful than ever imagined.."

~ Rune Bjornson, Executive VP, Statoil Hydro

".. a quiet revolution has taken place in North America..our view is founded on hard facts.."

~ Tony Hayward, CEO BP on US shale gas

".. Shale gas can meet US needs for 100 years"

ICIS

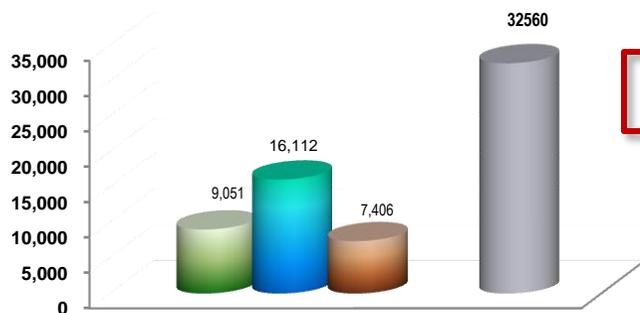
"By 2025 Europe wants to extract around 100 bcm of gas from shale deposits"

- SKRIN Newswire

The unconventional resource base of >32,000 Tcf will redefine the future dynamics of the global gas industry

Region	Coalbed Methane (Tcf)	Shale Gas (Tcf)	Tight-Sand Gas (Tcf)	Total (Tcf)
North America	3,017	3,842	1,371	8,228
Latin America	39	2,117	1,293	3,448
Western Europe	157	510	353	1,019
Central and Eastern Europe	118	39	78	235
Former Soviet Union	3,957	627	901	5,485
Middle East and North Africa	0	2,548	823	3,370
Sub-Saharan Africa	39	274	784	1,097
Centrally planned Asia and China	1,215	3,528	353	5,094
Pacific (Organization for Economic Cooperation and Development)	470	2,313	705	3,487
Other Asia Pacific	0	314	549	862
South Asia	39	0	196	235

WORLD



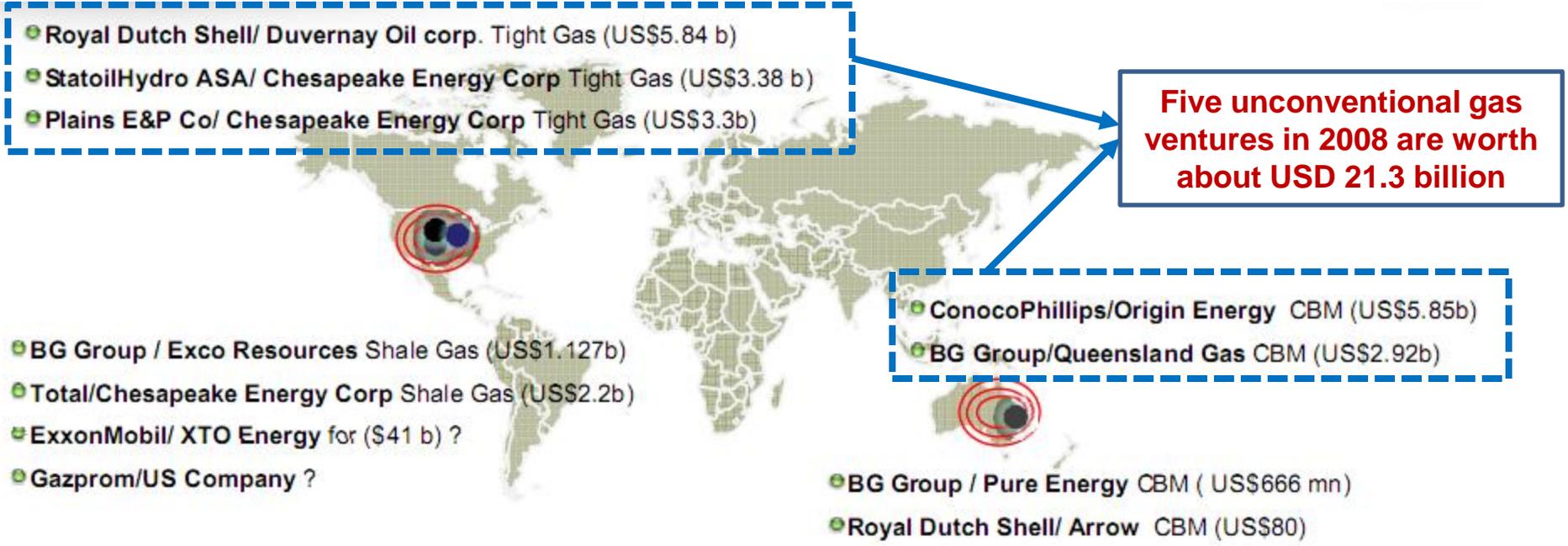
		in Tcf*	in Tcm**
	Coal-bed Methane	9,051	~ 256.3
	Shale gas	16,112	~ 456.3
	Tight gas	7,406	~ 209.7
	Total	32,560	~ 922.3

The biggest share of unconventional gas

conversion: 1 Tcf = 28.32 Bcm***

* Tcf = Trillion cubic feet
 ** Tcm = Trillion cubic metre
 *** Bcm = Billion cubic metre

Major trend in unconventional gas ventures



- 2008 - 5 out of top 10 deals were unconventional gas deals worth \$21.3 billion
- 2009 –
 - > US\$1b shale gas deals – mostly located in North America.
 - > US\$1b CBM deals signed – in Australia, China, US.
 - Many more potential deals were announced
- 2010 – Total/Chesapeake Deal (US\$2.2 b)/ Exxon XTO deal?

Major highlights on big players progressively building their positions in unconventional gas play globally

● CBM ● Tight Gas ● Shale Gas

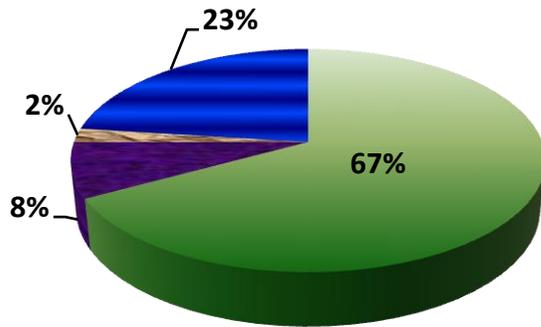


 <p>BG GROUP</p>	<p>BG's new source gas production in the medium-term is likely to be dominated by its tight gas project in Oman.</p>
	<p>ConocoPhillips is the largest CBM producer in the United States, and has experienced using high methane gas for LNG production (Kenai LNG).</p>
	<p>Shell, via its Arrow Energy acquisition will further pursue CBM plays in Australia, China, India, Indonesia and Vietnam. It is also pursuing tight gas in Algeria and Canada.</p>
	<p>ExxonMobil has an estimated total reserves of roughly 35 Tcf (991 Bcm) in the Piceance Basin. Will apply technology to unconventional gas reserves in Germany and Hungary.</p>
	<p>Sonatrach is looking for partners and devising strategy to develop its tight gas reserves in Algeria.</p>
	<p>Statoil Hydro and Chesapeake Energy agreed to jointly develop unconventional gas assets in China, Ukraine and Romania.</p>
	<p>BP is pursuing organic growth through unconventional gas plays in the U.S., India and Canada and also acquiring Chesapeake Energy Shale asset for USD 1.75b</p>

Source: PFC Energy, "Gas Competitor Service" – Various companies 2008, 2009
 PETRONAS CIRU Corporate Research, "Unconventional Gas: Future 'Game Changer' and Driver for New Ventures", December 2009
 PFC Energy, "Interest in Unconventional Gas Growing Globally", September 2009

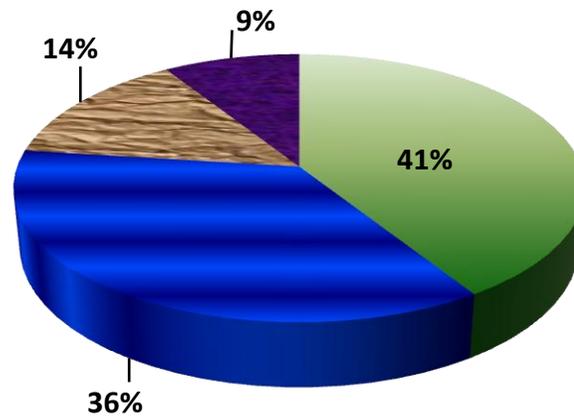
Shale gas production in the United States marks an era of unprecedented change

2000
51.8 bn cf /d



■ Conventional

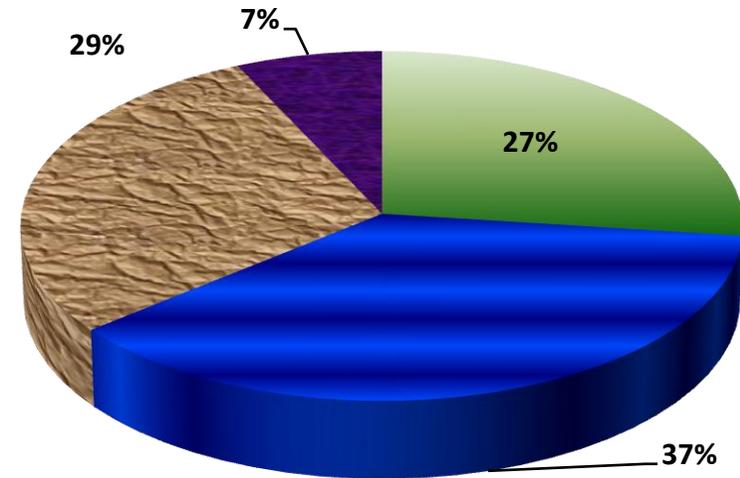
2009
55.0 bn cf /d



■ CBM

■ Shale Gas

2020
62.5 bn cf /d



■ Tight Gas

Estimated worldwide natural gas shale reserves



REGION	SHALE RESERVES
Asia Pacific	6,155 Tcf
North America	3,842 Tcf
Middle East	2,548 Tcf
South America	2,117 Tcf
Asia	627 Tcf
Europe	549 Tcf
Africa	274 Tcf
WORLDWIDE	16,112 Tcf

CBM-to-LNG ventures in Eastern Australia

No.	Date	Value (A\$/GJ)	Seller Buyer
1	March 2007	\$0.43	Queensland Gas Company Ltd. (QGC) AGL Energy Limited (AGL)
2	February 2008	\$0.67	Queensland Gas Company (QGC) BG Group (BG)
3	May 2008	\$1.32 - \$1.65	Santos PETRONAS
4	June 2008	\$0.46 - \$0.69	Arrow Energy Royal Dutch Shell
5	August 2008	\$0.74	Sunshine Gas Queensland Gas Company Ltd. (QGC)
6	September 2008	\$1.39 - \$1.88	Origin Energy ConocoPhillips
7	October 2008	\$0.67	Queensland Gas Company Ltd. (QGC) BG Group (BG)
8	December 2008	\$0.46 – \$0.53 (1)	Molopy-AJ Lucas AGL Energy Limited (AGL)
9	December 2008	\$1.04 (2)	Sydney Gas AGL Energy Limited (AGL)
10	February 2009	\$0.31 (3)	Pure Energy BG Group (BG)

**The highest CBM venture
in 2008 concluded**

(1) Based on AGL Indication of 700 – 800 PJ of 3P

(2) Assumes \$1.15 million of the \$171 million transaction was to acquire Huner acreage

(3) Based on BG's \$8.25/share takeover offer announced February 27

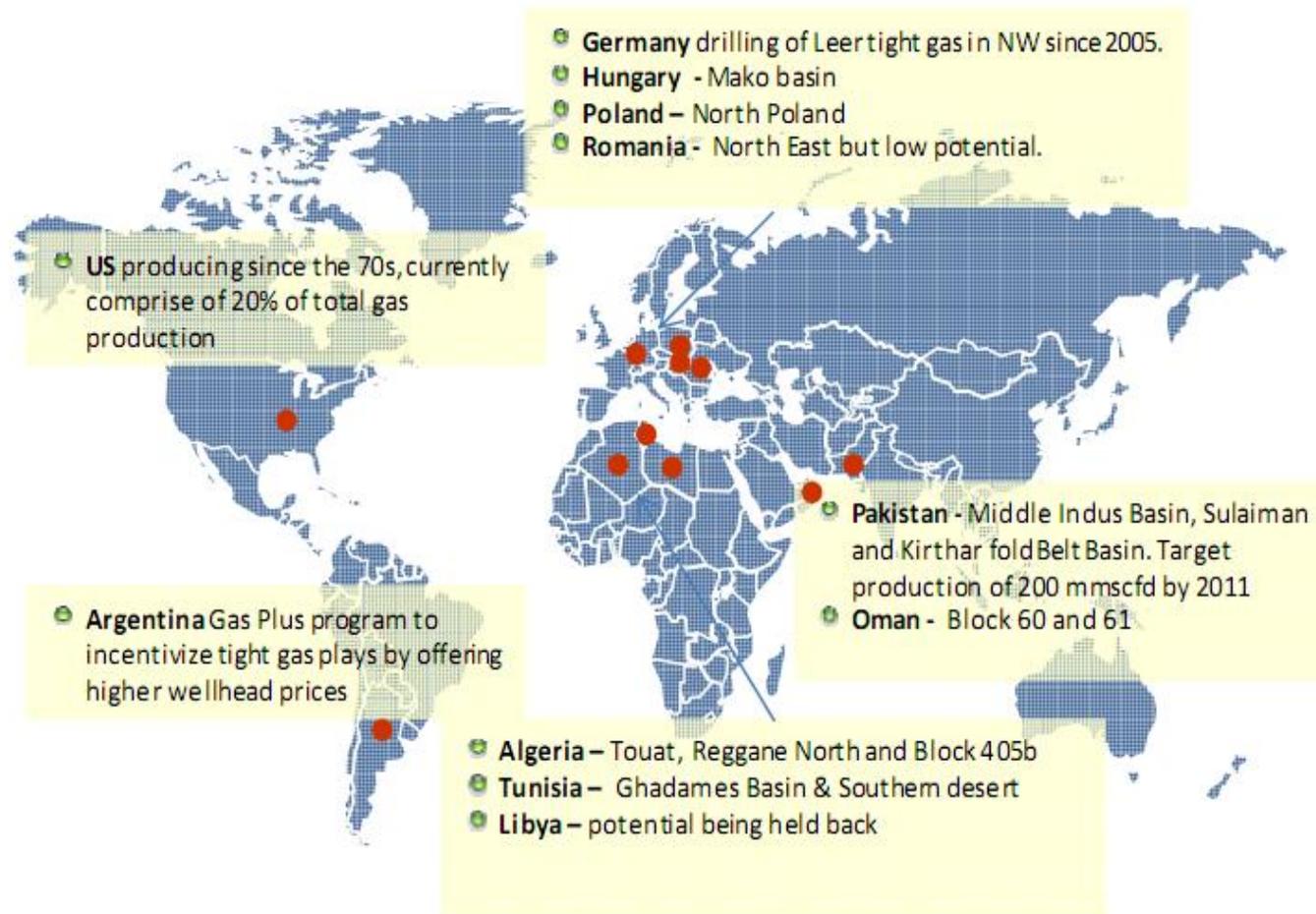
Australia's CBM-to-LNG project proposals

No.	Project	Proponent	Site	Capacity	Startup
1	Gladstone LNG	PETRONAS(40%) Santos (60%)	Curtis Island	3 MTPA (up to 10 MTPA)	2014
2	Queensland Curtis LNG	Queensland Gas Company (wholly-owned by BG)	Curtis Island	3 MTPA (up to 10 MTPA)	2013
3	Pacific LNG	Origin (50%) ConocoPhillips (50%)	Curtis Island	Up to 4 trains of 3.5 MTPA each (up to 16 MTPA)*	2014
4	Gladstone LNG (Fisherman's Landing)	LNG Ltd. (30%) Arrow LNG (70%)	Fisherman's Landing	1.5 MTPA	2013
5	Sun LNG	BG – Sojitz	Fisherman's Landing	0.5 MTPA	2012
6	LNG Impel Gladstone	LNG Impel** (wholly-owned by Galveston LNG) Royal Dutch Shell	Curtis Island	n/a	n/a

* contingent on future reserve addition

** Dormant proposal

Tight gas development is expected to grow globally



Tight gas drilling in Utah, U.S

Unconventional gas prospects as the catalyst for future gas balance and overall mix outlook

1) 'Gas supply shortage' situation

- Other challenges like regulations, technical, environmental, etc.

2) Introduction of a new/different fiscal regimes

- To cater for the unconventional gas business dynamics, there is a need for a new set of fiscal regimes



3) Securing investments will become more intense

- Unconventional gas to draw away new investments that may otherwise go into conventional gas play

8) Other challenge may include:-

- Geo-politics of natural gas - illustrates different sets of obstacles

Key deliverables at the 25th World Gas Conference (WGC) in Kuala Lumpur in 2012

KEY CHALLENGES



4) Gas prices remain lower due to global gas supply glut

- Production from unconventional sources and conventional LNG may worsen and prolong supply glut – prices expected to remain soften



7) Other infrastructure

- The pace of unconventional gas development can be slow if operated within a 'poor' infrastructure environment

6) Technology breakthrough, technical skills and supportive economics remain key drivers for future growth

- Pushing the industry far along the learning curve
- Making the development a lucrative proposition

5) Waning interest for imported gas from major markets

- Declining interest for imported gas especially from major consuming countries.

Unconventional gas prospects as the catalyst for future gas balance and overall mix outlook

1) Abundant gas resources

- Vast unconventional resource of more than 32,000 Tcf, may alter global gas balance outlook
- Reserves are more than double of conventional gas

2) Continuous R&D initiatives

- Economies of scale achieved
- To reduce unit production cost
- To enhance viability of projects



3) Energy security

- Key consuming countries to reduce dependency
- Key proponents are countries with limited/depleting conventional gas reserves

8) Conventional gas resource depletion and maturity

- There is a higher likelihood of developing unconventional gas within countries with mature or limited conventional gas reserves

HARNESSING OPPORTUNITIES



4) Open access

- Resource nationalism limits access only to conventional gas reserves
- Relatively low entry level providing opportunity for 'land grabbing' and new ventures

7) Ready market & infrastructure

- Ready market connected by developed infrastructure will expedite development



6) Environmental concerns and for sustainable development

- The need for clean energy will therefore promote the wider use of natural gas notably from unconventional sources.



5) Favorable policies in-place

- Policy with long-lasting effect will ensure the play remains economic even after the policy expires
- Policies on 'green' energy

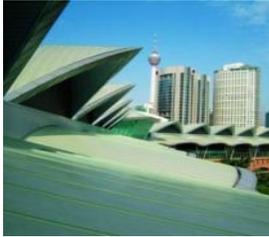
IGU Messages on Natural Gas

- Clean, efficient, versatile and environmental friendly fuel
- Available and abundant
- Continue to play a substantial role in global energy demand
- Basis for sustainable economic growth



Natural gas
– major part of the long term energy solution

The 25th World Gas Conference



KUALA LUMPUR
2012
WORLD GAS CONFERENCE

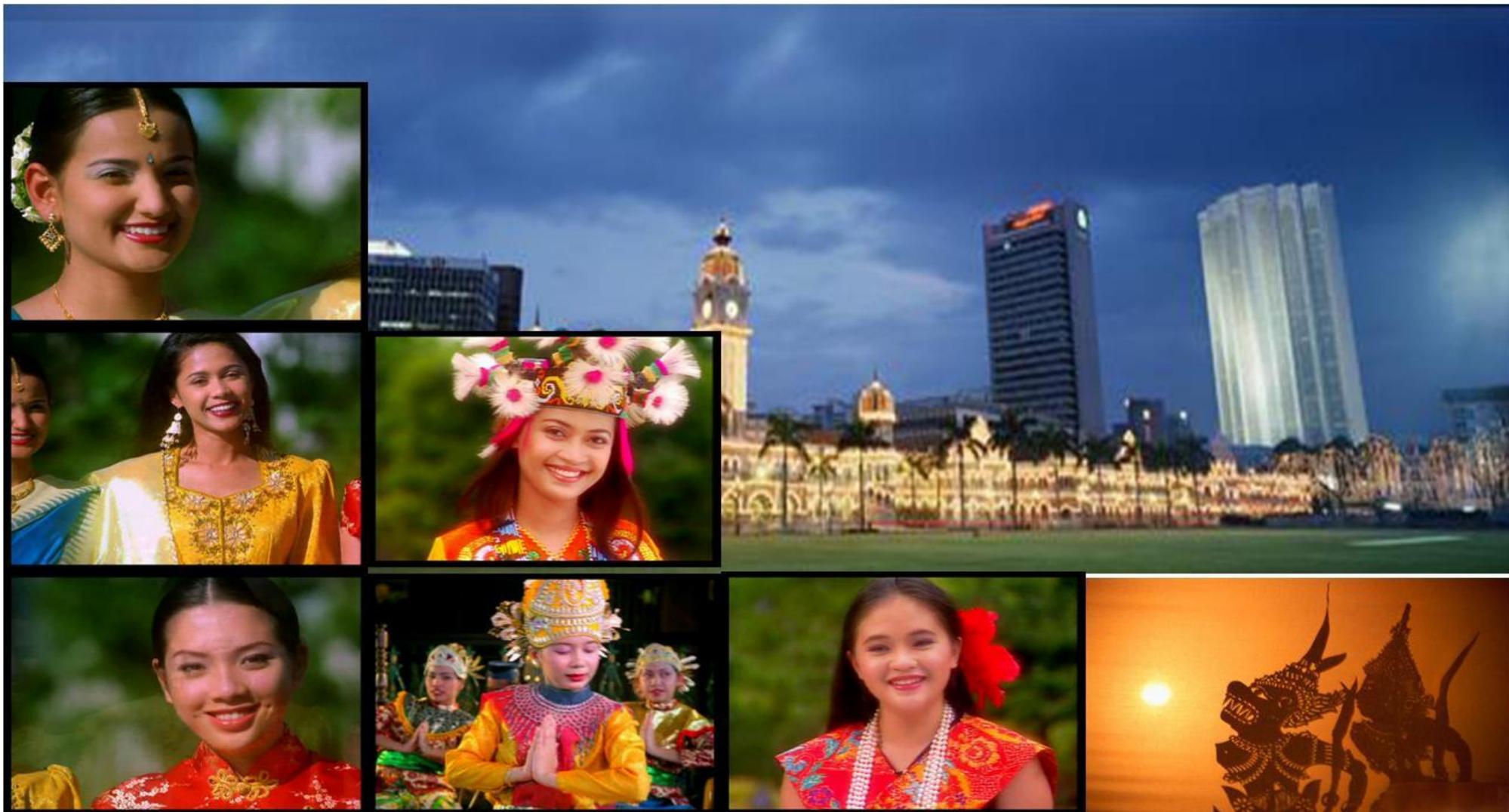
**“GAS : SUSTAINING FUTURE
GLOBAL GROWTH”**

**Kuala Lumpur Convention Centre
4 to 8 June, 2012**



CHARMING COUNTRY, COLOURFUL CITY

Should not miss our Malaysian Hospitality



THANK YOU FOR YOUR KIND ATTENTION!



Welcome to 25th World Gas Conference and Exhibition

4-8 June 2012
Kuala Lumpur, Malaysia

<http://www.igu.org/>
<http://wgc2012.com/>