

## HANDING OVER THE BATON

IGU Presidency passes  
from Malaysia to France



INTERNATIONAL GAS UNION  
UNION INTERNATIONALE DU GAZ

[www.igu.org](http://www.igu.org)





## The 25th World Gas Conference brought together:

- 5,299 delegates from 90 countries • 220 exhibitors from 43 countries • 13,803 visitors to the exhibition
- 712 conference abstracts submitted • 14 keynote speakers • 10 high level strategic panel sessions
- 4 luncheon speakers • 4 special addresses • More than 30 technical committee sessions
- 216 WGC2012 Youth Programme participants

**“Gas: Sustaining Future Global Growth”**  
**Kuala Lumpur, Malaysia**  
**4 - 8 June 2012**

[www.wgc2012.com](http://www.wgc2012.com)







THANK YOU  
for your participation  
& contribution to the success of  
the 25th World Gas Conference

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# Building

We're building oil and gas solutions for the industry.  
At GE, the future is at work.

GE imagination at work





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# International Gas

OCTOBER 2012 – MARCH 2013

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# Vision, Mission and Objectives

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The International Gas Union (IGU) is a world-wide, non-profit organisation promoting the progress of the gas industry. Through its many member countries representing approximately 95% of global gas sales, IGU covers all aspects of the natural gas industry.

## Vision

IGU shall be the most influential, effective and independent non-profit organisation serving as the spokesperson for the gas industry worldwide.

## Mission

- ◆ IGU will advocate for natural gas as an integral part of a sustainable global energy system.
- ◆ IGU will promote the political, technical and economic progress of the global gas industry, directly and through its members and in collaboration with other multilateral organisations.
- ◆ IGU will work to improve the competitiveness of gas in the world energy markets by promoting the development and application of new technologies and best practices, while emphasising sound environmental performance, safety and efficiency across the entire value chain.
- ◆ IGU will support and facilitate the global transfer of technology and know-how.
- ◆ IGU will maximise the value of its services to members and other stakeholders.

## Objectives

In striving towards the vision and fulfilling the mission, IGU will regarding:

**ECONOMY** Promote all activities within the entire gas chain, which can add to the technical and economic progress of gas;

**CUSTOMERS** Encourage development of good customer services and customer relations;

**TECHNOLOGY** Encourage research and development towards new and better technologies for the gas community;

**SAFETY** Promote the safe production, transmission, distribution and utilisation of gas;

**ENVIRONMENT** Encourage and promote development of clean technology, renewable energy applications and other activities, which will add to the environmental benefits of gas;

**INTERNATIONAL GAS TRADE** Encourage international trade in gas by supporting non-discriminatory policies and sound contracting principles and practices;

**LEGAL** Promote and contribute to the development of legislation concerning:

- ◆ the establishment of equitable, non-discriminatory and reasonable environmental and energy efficiency regulations, and
- ◆ efforts to establish appropriate and relevant international standards, as well as
- ◆ the promotion of and participation in the exchange of information relating to regulatory processes;

**COOPERATION** Enhance partnership with industry and manufacturers, and cooperation with governments, policymakers and international energy related organisations, and promote the exchange of information among members in order to help them in improving the efficiency and safety of gas operations.





## ideas for a brighter future

eni has always promoted advanced scientific research, rewarding the most innovative projects and discoveries in sustainable energy. The eni award is a prestigious prize awarded once a year to researchers who stand out internationally for their work on the new frontiers of hydrocarbons, unconventional renewable energies and environmental protection. To build a better future out of today's brightest ideas. Under the High Patronage of the President of the Republic of Italy.







# Energy and economic growth for the world.

Global energy demand is expected to be about 30 percent higher in the year 2040 than it was in 2010. Natural gas will play an increasingly important role in meeting this growing demand, while at the same time helping power economic growth and improving living standards.

A rising share of global natural gas demand will likely be met by unconventional gas supplies, such as those produced from shale and other rock formations.

So whether it's exploring for or producing new energy supplies, delivering innovative petroleum products or investing in communities, ExxonMobil is developing more than oil and gas—we are helping to support the future.

Learn more about our work at [exxonmobil.com](http://exxonmobil.com)

**ExxonMobil**

Taking on the world's toughest energy challenges.™



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Unless otherwise stated, the dollar (\$) values given in this magazine refer to the US dollar.



**In order to get here, we followed the most rigorous safety rules**

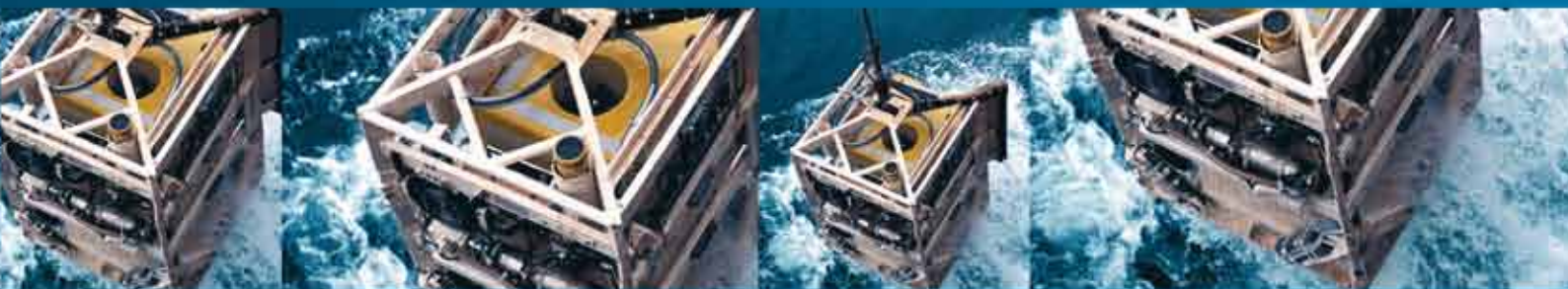


**and the most revolutionary theories.**



Throughout its history of over half a century, Petrobras has become one of the largest energy companies in the world. As a leader in exploration and production of oil in deep and ultra-deepwater, Petrobras is already producing in the area that





contains the largest oil accumulation ever found in Brazil: the offshore pre-salt layer. To confront this challenge, Petrobras is employing its usual strategy: research, technology, investments and safety. If the future is a challenge, Petrobras is ready for it.



CHALLENGE IS OUR ENERGY



# Message from the President

*Dear Colleagues*

As the Malaysian chapter in IGU's story drew to a close with the magnificent 25th World Gas Conference in Kuala Lumpur, the French three-year term began. It will culminate with the 26th WGC in Paris in June 2015.

The International Gas Union is creating history, triennium after triennium, expanding its membership and incorporating new cultures, whilst maintaining their individuality. Although the gas industry has become a worldwide business, globalisation does not mean uniformity, as it is important to take regional characteristics into account when building a world that shows greater respect for the environment.

One of the objectives of the French Triennium is to convince policymakers,



▶ Jérôme Ferrier, President.

▼ Members of the French team promoting WGC2015 in Kuala Lumpur with Christophe de Margerie, Chairman & CEO of Total. From left to right are Daniel Paccoud, NOC Chairman, Annie Louys, NOC Secretary, Christophe de Margerie, Caroline Hue, WGC2015, and Jérôme Ferrier.



opinion leaders and end-users that natural gas offers solutions to modern energy and environmental issues. Solutions must be found to a number of issues facing the gas world:

- ◆ How can we bring the huge shale gas reserves into production, while reassuring people that unconventional gas production is environmentally sustainable?
- ◆ Given the stable and calm legal and political environment required by the financial community, will financing be available to build the infrastructures required to speed up the development of gas production, liquefaction and transportation?
- ◆ Can we persuade the public that natural gas is the only plausible answer to growing energy requirements and the need to reduce CO<sub>2</sub> emissions?





◀ The closing ceremony of the 25th WGC marked the handover of the IGU Presidency from Malaysia to France.

The Triennial Work Programme has been designed to help address these issues and we are counting on the numerous representatives who have already signed up for the 14 Technical Committees to clarify what needs to be done.

A number of major energy events have been organised around the world up to the end of 2012, and IGU will be present at all of them. Rio Oil & Gas was set to take place in September as we went to press, GASEX will be held in Bali in October, COP 18 will start in Doha in November and the 3rd Ministerial Gas Forum will be co-hosted by IGU and IEF in Paris in mid-November. The latter will be an opportunity to stimulate discussions between the worlds of politics and business, and to establish areas of mutual understanding that will promote the development of the gas business.

◀ Paris will be the host city of the 26th WGC in 2015.

France is proud to have taken over the Presidency of IGU for the fourth time in its history and to host the next World Gas Conference in Paris – 78 years after it was first held there in 1937. We look forward to welcoming you to Paris in early June 2015, so that we can share our celebrations of this new chapter in the history of natural gas.




Jérôme Ferrier



Peru LNG



Peru LNG

# Reinforcing our competitive

**Repsol** is an international integrated oil and gas company operating in over 30 countries. It is a market leader in Spain and Argentina and the largest private energy company in Latin America in terms of assets.

Repsol is one of the largest LNG Operators in the world and has a strong LNG Marketing presence in both the Atlantic and Pacific Basins due to its position in the following LNG assets:

- **Liquefaction plants:**  
Atlantic LNG: 15 Mtpa  
Peru LNG: 4,45 Mtpa
- **Regasification plant:**  
Canaport™ LNG (Canada): 10 Bcma
- **11 LNG tankers: 2 Mm<sup>3</sup>**

In Atlantic LNG, Repsol owns 22.5% of the liquefaction facilities and has contracted to purchase 23% of the LNG produced by trains 2, 3 and 4.





# position in the LNG business

In Peru LNG, Repsol owns 10% of Camisea Field, that supplies natural gas to Peru LNG, 20% of the Peru LNG liquefaction facility and has contracted to purchase 100% of the LNG produced by the facility.

Repsol has sold LNG to 13 out of the 25 importing countries located worldwide.

Repsol owns 75% of the Canaport™ LNG facility, is the General Manager of Canaport™ LNG and has contracted for 100% of the capacity, through which Repsol regasifies LNG for sales to markets in Eastern Canada and New England.

Repsol's strong global presence in the Natural Gas Business is enhanced by its approximately 30% stake in Gas Natural Fenosa, which is the largest gas distributor in Spain and a significant player in Global LNG.



**REPSOL**

*Let's invent the future*

# Message from the Secretary General

*Dear Reader*

The 25th World Gas Conference which took place in Kuala Lumpur, Malaysia, June 4-8, 2012 was a resounding success with an excellent professional and social content.

The participation of many high-level industry executives and government representatives confirmed that the World Gas Conference is the most important meeting place for the gas industry. The conference confirmed the positive outlook for natural gas in light of the need for robust energy solutions and also to sustain global growth in an environmentally responsible manner.

I would like to highlight the following accomplishments for IGU from the 25th WGC:

- ◆ IGU launched its new and modernised logo designed to facilitate the promotion of the

▼ Torstein Indrebø,  
Secretary General.



Union to external stakeholders; and IGU's vision and mission were updated to reflect our long-term priorities. We have also redesigned the IGU Magazine incorporating the new logo.

- ◆ The *Global Vision for Gas* report launched in Kuala Lumpur provides for the first time a pathway showing how the world can achieve the emission targets recommended by the Intergovernmental Panel on Climate Change, and that increasing the use of gas will make an important contribution to these efforts. The report presents a quantified analysis of how gas can balance the concerns for climate change, economic development, air quality and public health, as well as the need for secure and reliable access to energy.

I hope that IGU members will present this report to policymakers in their respective countries. IGU will share the content with the United Nations, the International Energy Agency, the World Bank and other relevant international organisations.

- ◆ The IGU Secretariat, as well as the Technical Committees and Task Forces of the 2009-2012 Triennium produced many excellent reports and publications which can be downloaded free of charge from the IGU and WGC2012 websites.
- ◆ The winners of the IGU Gas Efficiency Award and the Social Gas Award were announced. The projects are presented in this issue.

## **The 2012-2015 Triennium**

The Council meeting that took place immediately before the conference confirmed Jérôme Ferrier as the President of IGU for 2012-2015 and Georges Liens as the Chair of the Coordination Committee.



► The 25th WGC in Kuala Lumpur was an outstanding success (BELOW). Speakers included Malaysia's former Prime Minister, Tun Mahathir Mohamad (BOTTOM RIGHT).



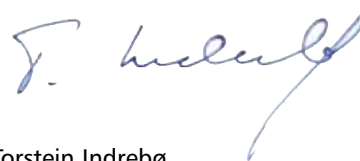
in the second half of 2012: World Shale was due to take place as we went to press in Houston, September 18-21; Australia Gas will be held in Sydney, October 31-November 2; and the Latin America Summit in the World Shale Series will be held in Buenos Aires, November 28-30.

- ◆ LNG 17 will take place in Houston, April 16-19, 2013 and is the most important and largest gas event next year. It will address all aspects related to LNG developments and will gather thousands of delegates from all over the world.
- ◆ The IGU Research Conference will be held in Copenhagen, September 19-21, 2014. The conference is a must for gas professionals interested in how gas-related R&D will impact the future business environment.

#### Magazine articles

You will find more information from Kuala Lumpur, the French Presidency and the Secretariat as well as several articles on topics relevant to the gas industry in the following pages.

Enjoy your reading!



Torstein Indrebø

The French Presidency has launched an ambitious Triennial Work Programme addressing the main challenges facing the gas industry. The 11 IGU Technical Committees and three Task Forces have already commenced their work.

The Council also elected the Executive Committee members for 2012-2015 and approved Cyprus as a new Charter Member.

The 26th WGC will take place in Paris during the first week of June 2015, but before that, we have other IGU events for you to mark in your calendar:

- ◆ IGU and the CWC Group are cooperating on other gas conferences and have three events





# Bringing energy to life

**Spain, 4:30 pm. For Tomas and his friends,  
the world is their playground.  
RasGas is there.**

RasGas supplies Europe, Asia and the Americas with liquefied natural gas, one of the world's most climate-friendly fossil fuels. From Qatar, one of the world's largest and most reliable sources.

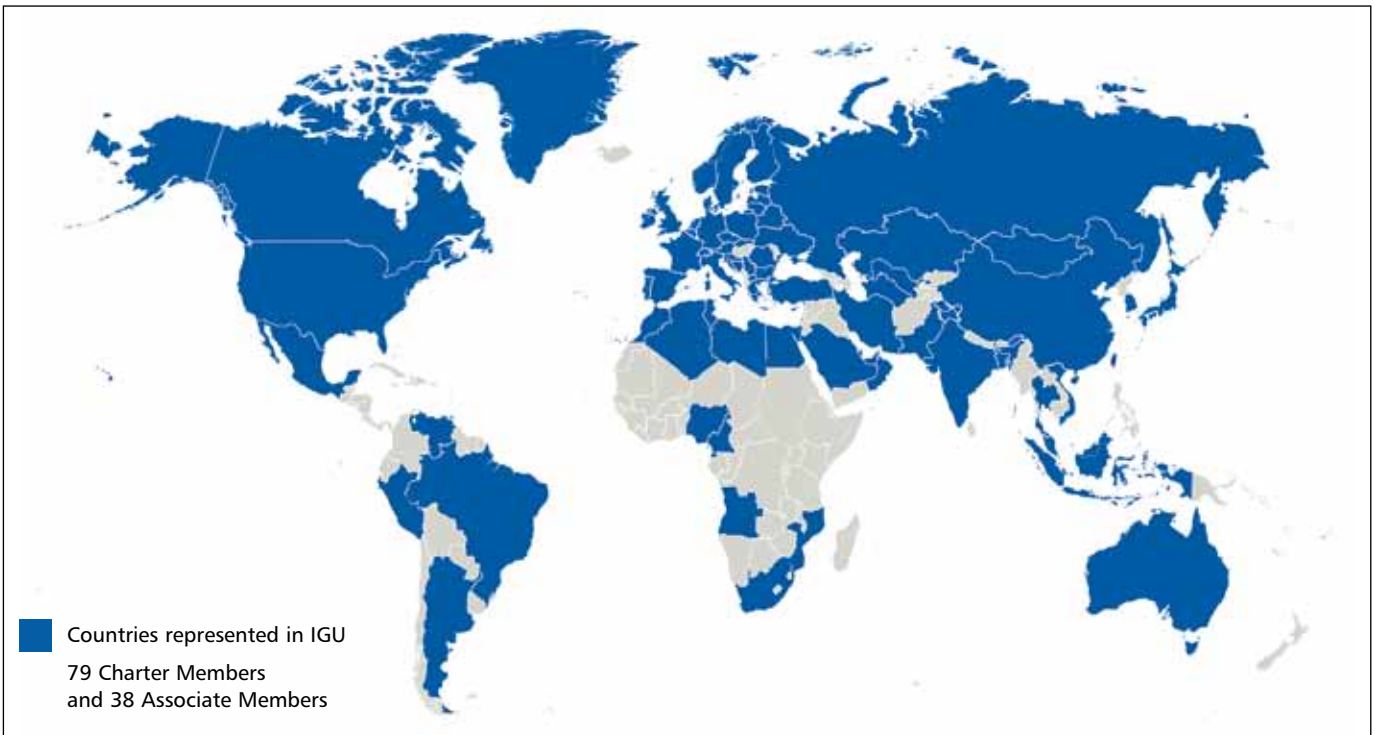




the power of the drop  
THE ENERGY TO TRANSFORM

# Countries Represented in IGU

Algeria	Equatorial Guinea	Mexico	South Africa
Angola	Estonia	Monaco	Spain
Argentina	Finland	Mongolia	Sweden
Australia	France	Morocco	Switzerland
Austria	Germany	Mozambique	Taiwan, China
Belarus, Republic of	Greece	Netherlands, The	Thailand
Belgium	Hong Kong, China	Nigeria	Timor-Leste
Bosnia and Herzegovina	India	Norway	Trinidad and Tobago
Brazil	Indonesia	Oman, Sultanate of	Tunisia
Brunei	Iran	Pakistan	Turkey
Bulgaria	Ireland	Peru	Ukraine
Cameroon	Israel	Poland	United Arab Emirates
Canada	Italy	Portugal	United Kingdom
China, People's Republic of	Japan	Qatar	United States of America
Croatia	Kazakhstan	Romania	Uzbekistan
Cyprus	Korea, Republic of	Russian Federation	Venezuela
Czech Republic	Latvia	Saudi Arabia	Vietnam
Denmark	Libya	Serbia	
Egypt	Lithuania	Singapore	
	Macedonia	Slovak Republic	
	Malaysia	Slovenia	





# I AM PART OF THE SOLUTION



## Gerbrand Bruin & Max

Beachcombers and supporters of the Sustainable Ameland Open Lab

My adventures at sea have taken me to all four corners of the globe. I have seen the world, but Ameland is the only place I could ever call home. Here, we are aware of how vulnerable nature is. This is why we are always looking for ways to keep the island clean. This means using less energy and generating energy in a smarter way. As a beachcomber, I am doing my bit to keep the island clean.

GasTerra is also doing its bit. As the instigators of the "Sustainable Ameland" project, we show how alternative energy sources can be practically applied in order to speed up the transition to a sustainable society. And time and time again, natural gas has played a key role in this transition. We are therefore part of the solution.

[www.iampartofthesolution.nl](http://www.iampartofthesolution.nl)

See my  
story!



## Charter Members

### *Algeria*

Association Algérienne de l'Industrie du Gaz – AIG

### *Angola*

Sonangol Gás Natural

### *Argentina*

Instituto Argentino del Petróleo y del Gas

### *Australia*

Australian Gas Industry Trust

### *Austria*

Österreichische Vereinigung für das Gas- und Wasserfach (ÖVGW)

*Belarus, Republic of*  
Beltransgas

### *Belgium*

Association Royale des Gaziers Belges

*Bosnia and Herzegovina*

Gas Association of Bosnia and Herzegovina

### *Brazil*

Associação Brasileira das Empresas Distribuidoras de Gás Canalizado (ABEGAS)

### *Brunei*

Brunei Energy Association

### *Bulgaria*

Overgas Inc.

### *Cameroon*

Société Nationale des Hydrocarbures

### *Canada*

Canadian Gas Association

### *China, People's Republic of*

China Gas Society

### *Croatia*

Croatian Gas Association

### *Cyprus*

Ministry of Commerce, Industry & Tourism

### *Czech Republic*

Czech Gas Association

### *Denmark*

Dansk Gas Forening – Danish Gas Association

### *Egypt*

Egyptian Gas Association

### *Equatorial Guinea*

Sociedad Nacional de Gas G.E.

### *Estonia*

Estonian Gas Association

### *Finland*

Finnish Gas Association

### *France*

Association Française du Gaz (AFG)

### *Germany*

Deutsche Vereinigung des Gas- und Wasserfaches e.V. (DVGW)

### *Greece*

Public Gas Corporation of Greece (DEPA) S.A.

### *Hong Kong, China*

The Hong Kong & China Gas Co. Ltd

### *India*

Gas Authority of India Ltd (GAIL)

### *Indonesia*

Indonesian Gas Association (IGA)

### *Iran*

National Iranian Gas Company (NIGC)

### *Ireland*

Irish Gas Association – Bord Gais Eireann

### *Israel*

The Israeli Institute of Energy & Environment

### *Italy*

Comitato Italiano Gas (CIG)

### *Japan*

The Japan Gas Association

### *Kazakhstan*

KazTransGas JSC

### *Korea, Republic of*

Korea Gas Union

### *Latvia*

JSC Latvijas Gāze

### *Libya*

National Oil Corporation

### *Lithuania*

Lithuanian Gas Association

### *Macedonia*

Macedonian Gas Association

### *Malaysia*

Malaysian Gas Association (MGA)

### *Mexico*

Asociación Mexicana de Gas Natural, A.C.

### *Monaco*

Société Monégasque de l'Électricité et du Gaz (SMEG)

### *Mongolia*

Baganuur Joint Stock Company

### *Morocco*

Fédération de l'Énergie de la Confédération Générale des Entreprises du Maroc (CGEM)

### *Mozambique*

Empresa Nacional de Hidrocarbonetos, E.P. (ENH)

### *Netherlands, The*

Royal Dutch Gas Association – Koninklijke Vereniging van Gasfabrikanten in Nederland (KVGN)

### *Nigeria*

Nigerian Gas Association c/o Nigeria LNG Ltd

### *Norway*

Norwegian Petroleum Society (NPF) – Norwegian Gas Association

### *Oman, Sultanate of*

Oman LNG L.L.C.

### *Pakistan*

Petroleum Institute of Pakistan

### *Peru*

Perúpetro S.A.

### *Poland*

Polskie Zrzeszenie Inżynierów i Techników Sanitarnych (PZITS) – Polish Gas Association

### *Portugal*

Associação Portuguesa das Empresas de Gás Natural

### *Qatar*

Qatar Liquefied Gas Company Ltd (Qatargas)

### *Romania*

S.N.G.N. Romgaz S.A.

### *Russian Federation*

OAO Gazprom

### *Saudi Arabia*

Saudi Aramco

### *Serbia*

Gas Association of Serbia

### *Singapore*

Power Gas Ltd

### *Slovak Republic*

Slovak Gas & Oil Association

### *Slovenia*

Geoplin d.o.o. Ljubljana

### *South Africa*

CEF (Pty) Ltd

### *Spain*

Spanish Gas Association – Asociación Española del Gas (SEDIGAS)

### *Sweden*

Swedish Gas Association – Energigas Sverige

### *Switzerland*

Schweizerische Aktiengesellschaft für Erdgas (SWISSGAS)

### *Taiwan, China*

The Gas Association of the Republic of China, Taipei

### *Thailand*

PTT Public Company Ltd

### *Timor-Leste*

Secretariat of State for Natural Resources (Government of the Democratic Republic of Timor-Leste)

### *Trinidad and Tobago*

The National Gas Company of Trinidad and Tobago Ltd

### *Tunisia*

Association Tunisienne du Pétrole et du Gaz (ATPG) c/o ETAP

### *Turkey*

BOTAŞ

### *Ukraine*

Naftogaz of Ukraine

### *United Arab Emirates*

Abu Dhabi Liquefaction Company Ltd (ADGAS)

### *United Kingdom*

The Institution of Gas Engineers and Managers

### *United States of America*

American Gas Association

### *Uzbekistan*

Uzbekneftegaz (UNG)

### *Venezuela*

Petróleos de Venezuela S.A. (PDVSA)

### *Vietnam*

Vietnam Oil and Gas Group (PetroVietnam)





## The Force of our Energy Empowers Our People

Sonangol EP is the exclusive Concessionary for liquid and gaseous hydrocarbon in Angola. Our activities include exploration, production, commercialization and refining of hydrocarbons and their derivatives.

The competitive vision of our affiliate Sonangol Gas Natural to supply the market, has made Angola a new player in the world of LNG exporters.

With 5.2 million tonnes a year of liquified natural gas to the international market, on schedule to be delivered in late 2012, sustainability and growth remains our priority.

Health, Safety and Environmental best practices are the standards to achieve.

## Associate Members

Australian Petroleum Production & Exploration Association – APPEA (Australia)  
 Bayerngas (Germany)  
 BG Group plc (United Kingdom)  
 BP Gas, Power & Renewables (United Kingdom)  
 Bursagaz (Turkey)  
 Cheniere Energy Inc. (USA)  
 Chevron Corp. (USA)  
 China National Petroleum Corporation (China)  
 ConocoPhillips Company (USA)  
 DanaGas (UAE)  
 Det Norske Veritas (Norway)  
 DNV KEMA (The Netherlands)  
 E.ON Ruhrgas AG (Germany)  
 ExxonMobil Gas & Power Marketing (USA)  
 Gaslink – Gas System Operator Ltd (Ireland)  
 GasTerra (The Netherlands)  
 GAZBIR – Association of Natural Gas Distributors of Turkey  
 GDF SUEZ (France)  
 IGDAŞ – Istanbul Gas Distribution Co. (Turkey)

Indian Oil Corporation Ltd (India)  
 Instituto Brasileiro de Petróleo, Gás e Biocombustíveis – IBP (Brazil)  
 Liander (The Netherlands)  
 N.V. Nederlandse Gasunie (The Netherlands)  
 OMV Gas & Power (Austria)  
 Origin Energy Limited (Australia)  
 Petróleo Brasileiro S.A. – Petrobras (Brazil)  
 Russian Gas Society (Russia)  
 RWE Deutschland AG (Germany)  
 Shell Gas & Power International B.V. (The Netherlands)  
 Société Suisse de l'Industrie du Gaz et des Eaux – SSIGE/SVGW (Switzerland)  
 Sonorgás (Portugal)  
 Spetsneftegaz NPO JSC (Russia)  
 Taqa Arabia (Egypt)  
 TBG – Transportadora Brasileira Gasoduto Bolívia-Brasil S/A (Brazil)  
 TOTAL S.A. (France)  
 Vopak LNG Holding B.V. (The Netherlands)  
 Wintershall (Germany)  
 Woodside (Australia)

## Organisations Affiliated to IGU

Energy Delta Institute (EDI)  
 Gas Infrastructure Europe (GIE)  
 Gas Technology Institute (GTI)  
 GERG – Groupe Européen de Recherches Gazières/European Gas Research Group  
 GIIGNL – Groupe International des Importateurs de Gaz Naturel Liquéfié/International Group of LNG Importers

NGV Global, the International Association for Natural Gas Vehicles including its regional affiliates  
 International Pipeline & Offshore Contractors Association (IPLOCA)  
 Marcogaz  
 Pipeline Research Council International, Inc. (PRCI)  
 Russian National Gas Vehicle Association (NGVRUS)



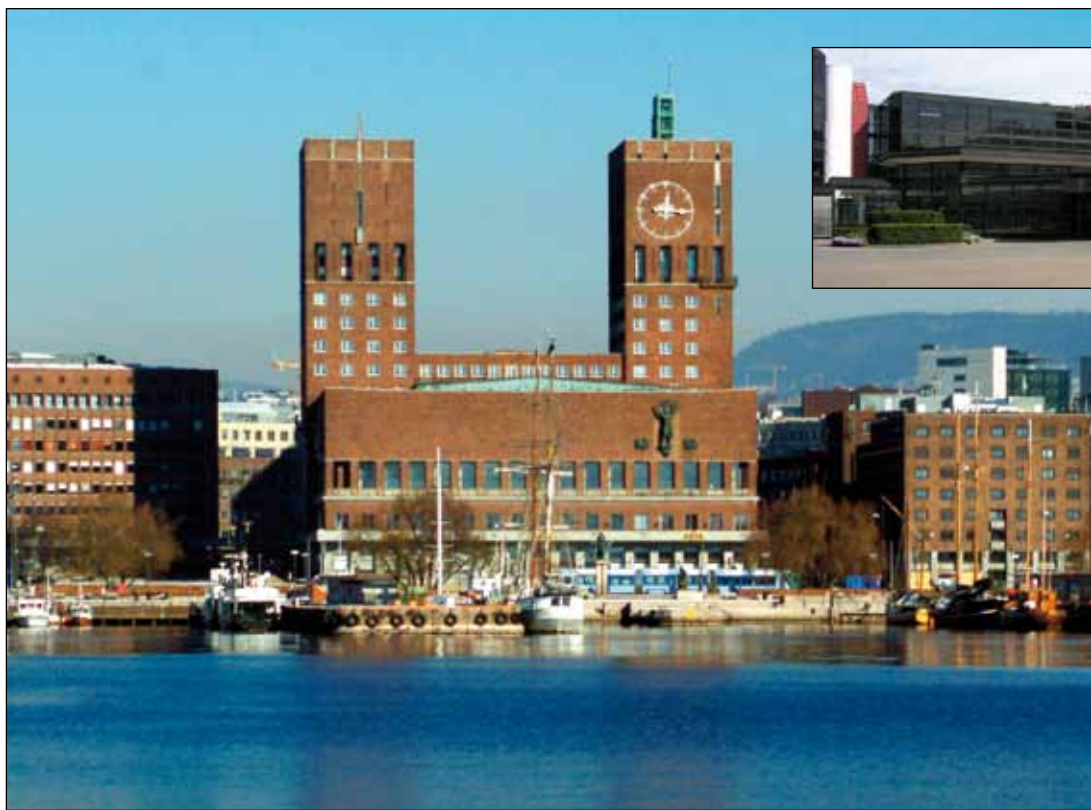
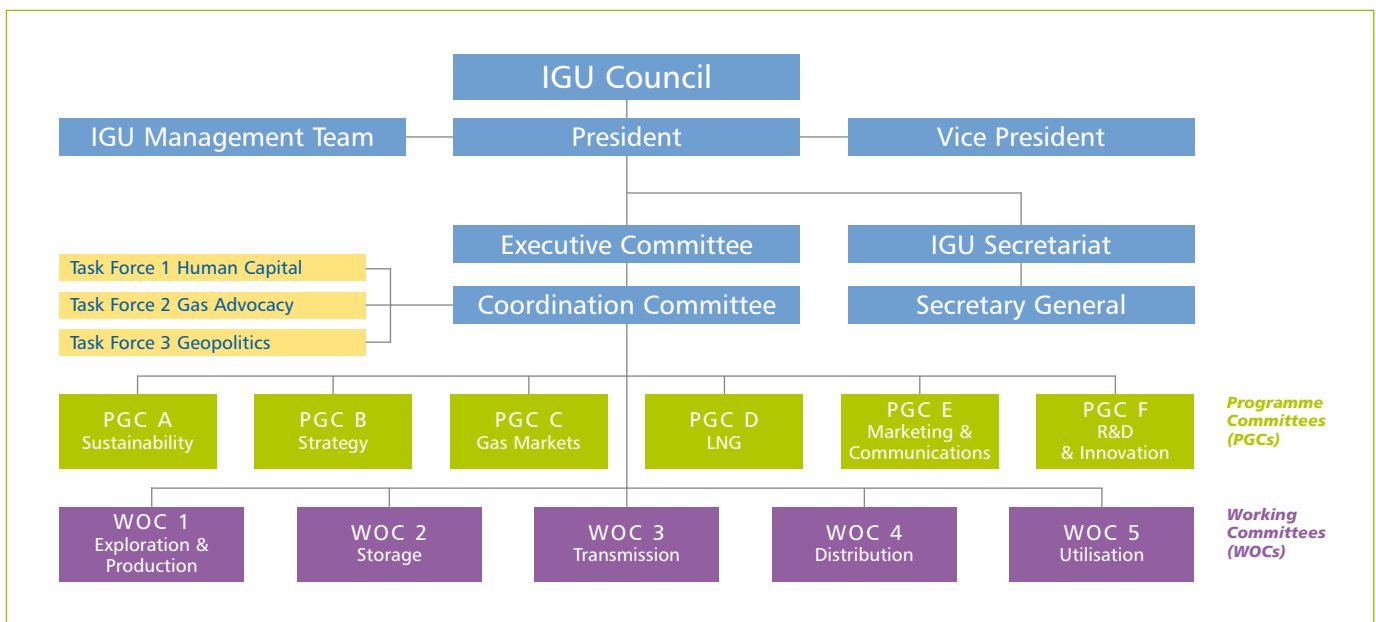


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BP is one of the world's largest and most experienced energy providers. Working with our partners and key stakeholders we produce more than 7bcfd of natural gas, and are developing new gas supplies in the Middle East, Africa, the Americas and Asia Pacific. Expanding and investing in our global LNG business we have expertise across the value chain to manage complex projects, and bring supply to market. Enhancing security and delivering the flexibility our customers require. We are an active marketer and trader in the world's most liquid markets – North America and the UK. And are increasingly active in the European and Asian markets. **Mutual advantage, experience and commercial innovation make BP a natural gas partner.**



# IGU Organisation 2012–2015



◀ The IGU Secretariat is currently located in Oslo, Norway, where it is hosted by Statoil at these offices in Sandvika (INSET).



## IGU Management Team



Mr Jérôme Ferrier, President  
(France)



Mr David Carroll, Vice President  
(USA)



Datuk (Dr) Abdul Rahim Hj Hashim,  
Immediate Past President  
(Malaysia)



Mr Georges Liens, Chairman of the  
Coordination Committee (France)



Mr Mel Ydreos, Vice Chairman  
of the Coordination Committee  
(Canada)



Mr Torstein Indrebø, Secretary  
General

## IGU Executive Committee

Mr Abdelhamid  
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Mr Carlos Seijo,  
Argentina

Ms Cheryl Cartwright,  
Australia

Mr Luis Domenech,  
Brazil

Ms Lixin Che, China

Mr Timothy M. Egan,  
Canada

Mr Mel Ydreos, Canada

Mr Jean Schweitzer,  
Denmark

Mr Jérôme Ferrier,  
France

Mr Georges Liens,  
France

Mr Walter Thielen,  
Germany

Mr Hiroyuki Wada,  
Japan

Mr Kap-Young Ryu,  
Republic of Korea

Datuk (Dr) Abdul Rahim  
Hj Hashim, Malaysia

Mr Gertjan Lankhorst,  
The Netherlands

Mr Runar Tjersland,  
Norway

Mr Jupiter Ramirez,  
Qatar

Mr Evgueni Riazantsev,  
Russia

Mr Pavol Janočko,  
Slovak Republic

Mr Antoni Peris  
Mingot, Spain

Mr David Carroll,  
United States of  
America

Hon. David McCurdy,  
United States of  
America

Mr Xia Yongjiang,  
China National  
Petroleum Corporation,  
Associate Member

Mr Philippe Miquel,  
GDF SUEZ, Associate  
Member

Mr Chris Gunner, Shell,  
Associate Member

Mr Khaled Abubakr,  
TAQA Arabia, Associate  
Member

Ms Cynthia Silveira,  
Total, Associate  
Member



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# News from the Secretariat

The IGU Secretariat's main activities since the last edition of the IGU Magazine (April-September 2012) are detailed below in news items and general information.

## **IGU at the 25th World Gas Conference 2012**

The IGU stand was visited by WGC participants and many IGU members. Publications including the "Global Vision for Gas", "Shale Gas" and other IGU reports from the Malaysian Triennium were handed out, while the IGU history book commemorating more than 80 years of our work was also distributed. All these publications can be found on the IGU website. This issue has a special section giving a full report on WGC2012 (see pages 73-154).

## **Winners of the IGU Awards**

The winners of the IGU Awards for the 2009-2012 Triennium are:

### *Gas Efficiency Award*

Kunihiro Nishizaki, Deputy General Manager, PEFC Development, Department of Technology Solutions, Tokyo Gas; and Kazuhiro Hirai, Manager, micro-CHP Development Department, Residential Energy Business Unit, Osaka Gas.

### *Social Gas Award*

Luis Felipe Fernández Pérez, former Commercial Natural Gas Manager, Pluspetrol Peru Corporation.

More information about the winning projects can be found on pages 46-48.

► The staff of the IGU Secretariat: (from left to right in the front row) Hans Riddervold, Director; Torstein Indrebø, Secretary General; Sjur Bøyum, Communication Manager & Webmaster; (from left to right in the back row) Ksenia Gladkova, Advisor to the Secretary General; Carolin Oebel, Senior Advisor to the Secretary General; Silje Storsul, Administration Consultant; Mats Fredriksson, Senior Advisor to the Secretary General.





### 3rd IEF-IGU Ministerial Gas Forum, France

The 3rd IEF-IGU Ministerial Gas Forum will take place in Paris, France, on November 16, 2012 under the theme: “Call for Sustainable Energy Policies and Improved Cooperation – Enhancing the Role of Natural Gas”.

The IEF-IGU Ministerial Gas Forum is now established as a regular platform for Ministers and senior decision makers to discuss key developments in the gas industry.

Ministers and industry leaders who attended the 2nd IEF-IGU Ministerial Gas Forum, held on November 30, 2010 in Doha, Qatar, expressed their satisfaction with its key findings and recommendations and affirmed that this newly established and now regular forum is an important step forward in the promotion of active dialogue among gas producers, consumers, transit countries and political leaders.

The 3rd IEF-IGU Ministerial Gas Forum provides a timely opportunity to discuss the recent developments in the gas industry and how sustained energy policies and improved cooperation would enhance the role of natural gas.

IEF and IGU expect more than 100 delegates to attend the Paris event. The Forum is taking place under the Chatham House Rule and is by invitation only.

### IGU at COP 17 and COP 18

IGU has been present at the annual UN climate change conferences (COP) for a number of years now. In 2011, COP 17 took place in Durban, South Africa, where IGU held a symposium with the title “Natural Gas – Powering the Low-Carbon Economy and Facilitating Access to Energy” on December 4. We reported on the event in the April edition of the IGU Magazine.

This December, IGU will also be present at COP 18 in Doha, Qatar. Here the focus will again be divided between the role of gas in climate change mitigation and its contribution to widening access to energy, and IGU will pay tribute to the UN initiative declaring 2012 the “International Year of Sustainable Energy for All”. There are still around 1.3 billion people in the world who do not have access to electricity.



◀ The IGU stand at WGC2012.

► IGU's stand at COP17 in Durban with (from left to right) Carolin Oebel, Sjur Bøyum, Ho Sook Wah and Torstein Indrebø.



More information will be available via the IGU website when we get closer to the event.

### Cooperation agreement for the LNG X series of conferences

One of IGU's flagship events, the triennial conference and exhibition on liquefied natural gas, is the largest LNG event in the world and is jointly organised by IGU, the Gas Technology Institute (GTI) and the International Institute of Refrigeration (IIR). After the LNG 17 Steering Committee meeting in Kuala Lumpur on June 9, 2012, an agreement on structure and procedure for the LNG X events was signed in order to regulate relations between the three organising institutions.

### LNG 17 in Houston, April 16-19, 2013

The 17th International Conference and Exhibition on LNG is now less than seven months away. Under the auspices of IGU, GTI and IIR, the event is being hosted by the American Gas Association in Houston, Texas, USA, April 16-19, 2013. This will be the first time the event has been held in the USA since 1986, and it will be the largest global gas industry event in 2013.

Some 5,000 delegates from 80 countries are expected to attend LNG 17. The event will feature strategic, technical and commercial sessions, complemented by a major exhibition.

The tremendous growth of the LNG industry globally means that LNG 17 will be the premier gas industry event to attend in 2013. In addition to the traditional exhibition, there will be special pavilions focusing on Gas Energy Education and LNG for Transportation. Exhibition space and sponsorships are moving at a record pace. Shell is the Principal Sponsor for LNG 17, the international law firm Baker Botts, ExxonMobil and Sonatrach are Diamond Sponsors and many companies are supporting the event in other sponsorship categories.

A preview of LNG 17 can be found on pages 68-70.

### IGRC2014: Planning on schedule

IGU's next research conference – IGRC2014 – will take place in Copenhagen, Denmark, September 17-19, 2014. The theme will be "Gas Innovations Inspiring Clean Energy", and the venue will be the Tivoli Congress Centre conveniently located in the heart of Copenhagen.

The conference is being organised by the Danish Gas Technology Centre and the technical programme is being developed by IGU's Programme Committee F – R&D and Innovation. The programme committee had its first official meeting at the 25th WGC in Kuala Lumpur in June and will meet again at the beginning of October in Copenhagen. In addition to the oral papers and an extensive poster session, there will be an exhibition of innovative gas technology equipment and services.

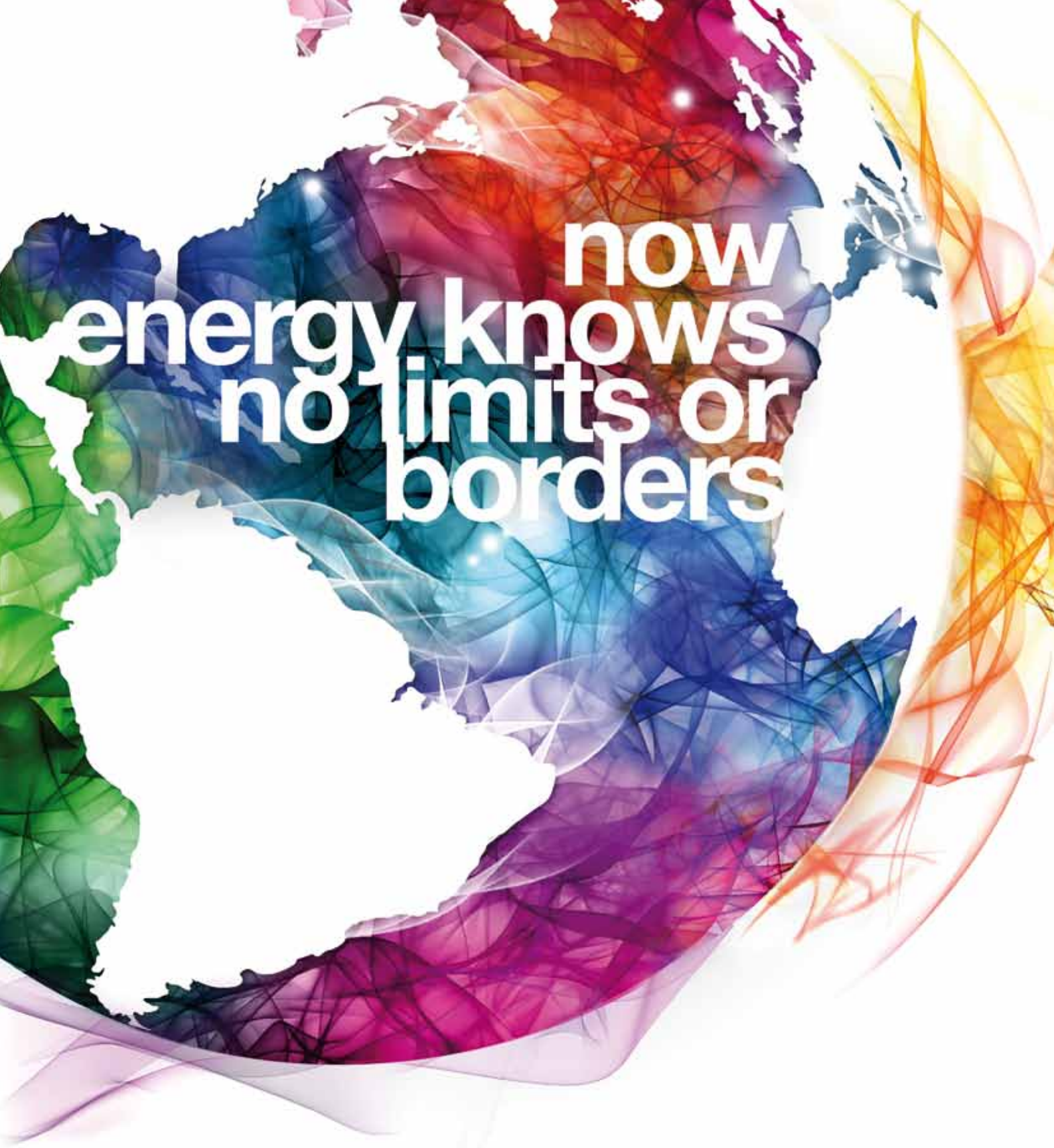
A worldwide network of IGRC2014 Ambassadors has been established and the first major sponsors have already been mobilised. More information can be found on [www.igrc2014.com](http://www.igrc2014.com), where you may also sign up for IGRC announcements and newsletters.

### Gas advocacy work

#### Toolkit

Gas advocacy continues to be an important part of IGU's work and the Union is very active in promoting the benefits of natural gas to the general public, politicians and other non-





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industry stakeholders. Efforts have been made by IGU to establish a clear and coherent message on the role natural gas can and should play in the energy mix – especially considering its potential contribution to the mitigation of climate change and widening access to energy.

In order to provide a “toolkit” that members can use in the context of a customised communication strategy, IGU has issued different “tools” that are available on the website under [www.igu.org/gas-advocacy](http://www.igu.org/gas-advocacy). Furthermore, you can find the latest IGU publications under [www.igu.org/igu-publications](http://www.igu.org/igu-publications).

#### ***March 2012 Executive Committee meeting***

A workshop with four presentations was held during the Executive Committee meeting in Houston, USA, March 13-15. Michael Stoppard of IHS CERA presented the highlights of the Global Vision for Gas report. Mel Ydreos, Vice President, Government and Aboriginal Affairs at Union Gas, worked through the report on shale gas. Steven Mueller, President and CEO of Southwestern Energy, gave an insight into how to communicate with people in an area of shale gas operations, and some suggestions on how to reduce the impact on the local community such as working on logistical solutions that reduce the number of trucks needed for a project. Dave McCurdy, President and CEO of the American Gas Association, gave a presentation on how to communicate with politicians based on his own experience.

#### ***Global Vision for Gas, The Pathway towards a Sustainable Energy Future***

This report presents a global vision of how clean and affordable natural gas can contribute to the mitigation of climate change and sustained economic growth. The aim is to remind both the gas industry and the global energy community that natural gas is an energy source with excellent properties in almost any context.

The report consists of 50 pages of text and figures with sections on the abundance of

natural gas, its affordability for an increasing number of countries and the environmental benefits of an increased use of gas (acceptability). This triple “A” message has been expanded in the report by introducing two additional As. Adaptability highlights the short timeframe needed to convert from coal to gas in power generation and the role gas can play in backing up intermittent supplies from wind and solar. The last A is the increased accessibility through LNG and the expanding pipeline network in almost all regions of the world.

#### ***Shale Gas: The Facts about the Environmental Concerns***

The shale gas revolution of the last few years has had a dramatic impact on the natural gas industry and boosted exploration and production activities. However, shale gas developments are receiving a great deal of public scrutiny and the debate over the environmental impact of the technology used – particularly hydraulic fracturing – has raised some genuinely important issues.

Environmentalists claim the extraction process could contaminate rivers and aquifers and increase air emissions, while the gas industry points out that hydraulic fracturing has been used safely for decades.

IGU saw the need to respond to these environmental concerns and to reshape the debate about shale gas production. In late 2011, the decision was made to produce a special report. This was developed by a small team chaired by Mel Ydreos of Union Gas who was then the Chair of the IGU Task Force on Geopolitics and is now Vice Chair of the Coordination Committee.

“Shale Gas – the Facts about the Environmental Concerns” was one of the most popular reports distributed from the IGU stand during the 25th WGC. The report, which was originally published in English and has now been translated into Danish and Spanish, addresses the main concerns in an accessible way. It is an excellent tool for discussions about the





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▶▶ Jérôme Ferrier gave a speech during GasNaturally's gas week in Brussels (above). Other IGU participants included Sjur Bøyum, Datuk Abdul Rahim Hashim and Torstein Indrebø, seen (above right) with Jean-Claude Depail and Abel Enríquez, respectively President and Executive Secretary of GIE.

processes involved in shale gas production and is available on the IGU website.

#### **GasNaturally initiative**

The European Commission published the Energy Roadmap 2050 in December 2011. This roadmap aims to establish guidelines for discussion of the future energy mix in Europe.

IGU is cooperating with six other gas associations based in Europe (Eurogas, GERG, GIE, GIIGNL, Marcogaz and OGP – the International Association of Oil and Gas Producers) in a joint gas advocacy programme called GasNaturally. The aim is to ensure that natural gas is well represented in the debate in Brussels.

The GasNaturally programme kicked off with a debate in Brussels on February 15, when leading experts took part in the "Member States Gas Forum, Gas for Europe's Energy Future". This was followed by Gas Week 2012 (April 23-27), which was organised in the EU parliament building to inform Members of Parliament (MEPs) and their assistants about the benefits of natural gas.

The exhibition that had already been shown at the Members States Forum was set up for the whole gas week and was complemented by a series of speeches by experts from GasNaturally member organisations and companies. GasNaturally also organised a well-attended European Parliament hearing on how gas and

renewables can work together, as well as several receptions and a media breakfast.

GasNaturally provided speakers from the industry and also invited people from the EU system such as MEP Amalia Sartori, Chair of the EU Parliament's Committee on Industry, Research and Energy, and MEP Niki Tzavela, Rapporteur of the EU Energy Roadmap 2050. For the hearing GasNaturally was supported by the European Photovoltaic Industry Association.

The IGU management team supported this important event. The then Vice President (now President), Jérôme Ferrier, gave a speech as one of the industry participants; while the President (now Immediate Past President), Datuk Abdul Rahim Hashim, the then Chair of the Coordination Committee, Ho Sook Wah, and Secretary General, Torstein Indrebø, took part in various parallel meetings during the gas week.

The associations working together in GasNaturally intend to continue their cooperation in 2013. More information about the gas week and GasNaturally can be found on the website [www.gasnaturally.eu](http://www.gasnaturally.eu).

#### **2012 UN initiative: International Year of Sustainable Energy for All**

Following the meeting with the Chair of UN Energy and UNIDO Director-General, Dr Kandeh K. Yumkella and Dmitri I. Piskounov, Managing



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▲ Carolyn Oebel and Torstein Indrebø with Dr Kandeh K. Yumkella at UNIDO's headquarters in Vienna.

Director of UNIDO's Programme Development and Technical Cooperation Division in Durban, South Africa on December 5, 2011, the Secretary General together with Senior Advisor Carolyn Oebel met again with Dr Yumkella and several of his team to further discuss how IGU can support the UN initiative regarding sustainable energy for all. This meeting took place in the UNIDO headquarters in Vienna on August 13.

In this context a training programme for the sub-Saharan-African region was proposed to contribute to commercial development of the domestic energy markets, including power generation, residential energy use and the transportation sector. This programme is intended to be

taken forward jointly by IGU and UNIDO. The IGU Regional Coordinator for Africa, Khaled AbuBakr has also participated in some of the meetings with UNIDO and actively supports the work.

### **IGU at international events**

The IGU management team attends a large number of energy events. Below we have listed a few of the most important.

#### ***Oran International Shale Gas Workshop***

The Secretary General and Ho Sook Wah, took part in a shale gas workshop in Oran, Algeria, February 27-29, each giving a speech and chairing a discussion panel. The Algerian Minister of Energy & Mines, Youcef Yousfi, opened the workshop, which was organised by Sonatrach.

#### ***7th Asian Gas Partnership Summit***

Datuk Abdul Rahim Hashim and the Secretary General took part in the 7th Asian Gas Partnership summit in New Delhi, India, March 23-24. IGU presented the environmental benefits of natural gas to an Indian and international audience of between 700 and 800 delegates.

#### ***China International LNG Conference***

Datuk Abdul Rahim Hashim attended LNG China 2012, which was held in Beijing, June 26-29,

▶ Datuk Abdul Rahim Hashim addressing LNG China 2012.

▶▶ Carolyn Oebel addressing LNGgc in London.





and gave an address entitled “LNG in China; Now and Future in Global LNG Business”.

### **2nd LNG Global Congress**

Carolin Oebel, Senior Advisor to the Secretary General, gave a presentation during the keynote session “The Gas Market” which started off the first day of the 2nd LNG Global Congress (LNGgc) in London, UK on June 27. She presented the main findings of the newly released IGU report “Global Vision For Gas: The Pathway To A Sustainable Energy Future”, providing a wider perspective for the future of gas in general and LNG in particular. The remainder of the conference focused on different aspects of the LNG business looking both at specifics of the LNG value chain as well as global and regional developments.

### **10th Russian Petroleum and Gas Congress (RPGC 2012)**

Together with Gazprom, IGU was one of the partners for the Gas Day of RPGC 2012, which took place in Moscow on June 27. The Secretary General chaired the morning session, and Ksenia Gladkova, Advisor to the Secretary General, addressed the delegates with a presentation on “The Global Vision for Gas”.

### **Crans Montana Forum**

The 23rd annual session of the Crans Montana Forum addressed global energy challenges and took place in Baku, Azerbaijan, June 28-July 1. It was opened by the President of Azerbaijan, Ilham Aliyev. The Secretary General represented IGU and his presentation looked at how the gas industry can contribute to the mitigation of climate change while at the same time balancing other needs such as economic development and providing energy to the developing world.

### **Caspian Gas Forum 2012**

The Caspian Gas Forum, which was held in Istanbul, Turkey, July 3-5, focused on the strategic, commercial and geopolitical issues related



to gas in the Caspian region, which is rich in gas resources with a significant potential both for export and domestic use. The many alternative transit alternatives were also on the agenda. Hans Riddervold, Director of the IGU Secretariat, gave a keynote address in which he covered the market potential for gas, pointing to the many advantages of gas as a fuel for the long term.

▲ Ksenia Gladkova addressing RPGC 2012 in Moscow.

### **Peru Energy Day**

Roberto Brandt, IGU Honorary Member, presented the main contents of IGU’s Global Vision for Gas report during the Peru Energy Day in Lima on July 3, and also looked at shale gas developments and potential in Latin America.

▼ On stage with Torstein Indrebø during the Crans Montana Forum are Jaap Huijskes, a member of OMV’s Executive Board (left), and Hasan Murat Mercan, the Turkish Deputy Minister of Energy & Natural Resources (right).



# GDF SUEZ invests in the future of E&P in the UK

GDF SUEZ Exploration & Production International, a subsidiary of GDF SUEZ Group, operates in 16 countries, with a portfolio of 344 exploration or/and production licences, of which 192 are operated (56%). In 2011, its 2P\* reserves were 789 million boe (barrels of oil equivalent) and its production was 57.8 million boe.

For 15 years GDF SUEZ E&P UK Ltd, the affiliate in the UK, has been building its business in the UK Continental Shelf (UKCS) developing a portfolio of more than 40 licences in the Central and Southern North Sea and West of Shetland, 16 of which it operates.

However, 2012 marks a step change in the company's ambition to become a leading E&P operator in the UK, as significant progress is being made on two exciting major operated projects, Cygnus and Juliet. Both are poised for development which will see the company dramatically increase its investment, activity and presence in the UK.

Jean-Marie Dauger, Executive Vice-President of GDF SUEZ in charge of the Global Gas & LNG business line said, "GDF SUEZ is an increasingly significant player in oil and gas exploration and production in the UKCS. Cygnus and Juliet are important projects for the UK gas industry overall and they demonstrate our commitment to the North Sea, where we are a leading player not only in the UK but also in the Netherlands and in Norway."

Cygnus, which was sanctioned in August 2012, is the largest gas discovery in the Southern North Sea for the last 25 years. With 2P reserves of around 18 bcm, Cygnus is the sixth largest gas field in the UK by remaining reserves.

The development of the Cygnus field is expected to create around 4,000 jobs in the UK across the supply chain. At peak production, the field will account for



On August 6, 2012, the UK's Secretary of State for Energy and Climate Change, Edward Davey and Jean-Marie Dauger, Executive Vice President GDF SUEZ, welcome the sanction for the development of Cygnus, the biggest gas field discovered in the UK for the last 25 years.

around 5% of the UK's total gas production, enough to meet the demand of nearly 1.5 million homes.

Together with partners Centrica and Bayerngas, GDF SUEZ E&P UK, plans to invest £1.4 billion to develop the project.

The detailed development concept comprises two drilling centres, four platforms and initially 10 development wells; the planned export route is through the ETS pipeline system to the Bacton gas terminal in Norfolk. First gas is expected in late 2015, with a yearly production of 2.3 bcm by 2016.

Another GDF SUEZ E&P UK main project in the Southern North Sea is the subsea gas development Juliet. It was sanctioned in June 2012 and will be operated by GDF SUEZ (51.56%) with partners First Oil Expro Limited (29.44%) and Hydrocarbons Limited (19%). First gas is expected in Q4 2013 and peak production is anticipated to be 0.8 bcm per year.

Juliet will comprise two horizontal subsea wells tied back approximately 22km to the Pickerill A platform operated by Perenco UK Ltd. Existing infrastructure will transport the gas to the Theddlethorpe terminal on the Lincolnshire coast.

In the Central North Sea, where the company has a wide-ranging and exciting portfolio of discoveries and prospects, GDF SUEZ E&P UK is implementing an ambitious drilling programme. After discovering the Faraday field at the end of 2011, it has recently successfully completed the first appraisal well on the Jacqui discovery and will drill two additional wells by the end of 2012. In the West of Shetland, which is a key long term growth area for gas, GDF SUEZ E&P UK will drill its first two non-operated wells in the coming months.

Jean-Claude Perdigues, Managing Director, GDF SUEZ E&P UK commented, "The UK presents a fantastic long-term growth option alongside our projects around the globe. The expertise and innovative approach to exploration and production in the UK is formidable, and we aim to remain at the forefront of the industry in the region.

"The volumes of remaining undiscovered reserves, promising opportunities in the North Sea and the West of Shetland frontier, and the quality and talent of the people in our industry are extremely compelling."

\* Proven plus probable reserves.





# GDF SUEZ, A GLOBAL PLAYER IN THE NATURAL GAS VALUE CHAIN

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BY PEOPLE FOR PEOPLE

# Malaysia Hosts the June Council Meeting

By Mark Blacklock

With 2012 being a World Gas Conference year the IGU Council is meeting twice. The first gathering was held immediately prior to the opening of the 25th WGC in Kuala Lumpur on June 4, while the second will be held in Ottawa in October.

The Kuala Lumpur meeting was held in the Impiana Hotel and attended by 134 delegates. Business focused on the handover of the Presidency from Malaysia to France and plans for the new Triennium. The IGU Awards were presented and delegates were also briefed on IGU's latest publications, forthcoming events and other information from the Secretariat.

After a welcome from the President, Datuk Abdul Rahim Hashim, the minutes of the 2011 Council meeting in Dubrovnik were approved. He then gave floor to the Secretary General,

Torstein Indrebø, who introduced Mats Fredriksson to delegates. Mats had joined the Secretariat as Senior Advisor in March and this was his first Council meeting.

## Events

Datuk Rahim went on to inform delegates that the theme for the 3rd IEF-IGU Ministerial Forum to be held in Paris on November 16 would be "Call for Sustainable Energy Policies – Enhancing the Role of Gas". The event will be hosted by the French Ministry of Energy and is an important arena for dialogue between policymakers and industry leaders. It follows the successful IEF-IGU Ministerial Forums held in Vienna in 2008 and Doha in 2010.

IGU has become a regular participant in the annual UN Climate Change Conferences

▼ Datuk Abdul Rahim Hashim convening his last Council meeting as President.





and an event will be held during COP 18 in Doha. The main topics will be the role of gas in climate change mitigation and energy access for all.

An important event in the IGU calendar for 2013 will be LNG 17 in Houston, April 16-19. Delegate registration opened the day of the Council meeting and Jay Copan, Executive Director of the National Organising Committee (NOC), took the floor to brief delegates on preparations. "It will be the largest gas event in 2013," he declared.

The next IGU Research Conference (IGRC) will be held in Copenhagen's Tivoli Congress Centre, September 17-19, 2014, with the theme "Gas Innovations Inspiring Clean Energy". Peter Hinstrup of the Danish Gas Technology Centre is



▲ The June Council meeting was attended by 134 delegates.

the Conference Director and Jack Lewnard of the Gas Technology Institute is chairing the new Programme Committee F, which is responsible for the technical programme.

## Publications

### Special IGU Publications

Global Vision for Gas: The Pathway towards a Sustainable Energy Future  
 IGU Natural Gas Conversion Guide  
 IGU Natural Gas Conversion Pocketbook  
 International Gas Union 1931-2012  
 Shale Gas: The Facts about the Environmental Concerns  
 World LNG Report 2011

### Committee Publications

Best Practices and IGU Awards  
 Building Strategic Human Capital  
 Everything You Wanted to Know about Gas... but Were Afraid to Ask  
 Geopolitics and Natural Gas  
 Natural Gas Industry Study to 2030: An Update on Supply, Demand and Trade  
 Nurturing the Future Generations for the Oil and Gas Industry  
 Reduction of Greenhouse Gases: A Technology Guide  
 Renewable Gas: The Sustainable Energy Solution  
 WGC2012 Youth Programme Book

## Publications

Datuk Rahim announced the publication of the IGU anniversary book commemorating the Union's history since 1931 and 25 World Gas Conferences, and Council members received the first copies. Further copies were distributed to WGC delegates from the IGU stand in the WGC exhibition; while the Secretariat has a supply to hand out as presentation copies.

Five other special IGU publications were launched together with nine publications by the technical committees (see box). Later during the Council meeting detailed presentations were given on "The Global Vision for Gas" and "Shale Gas: The Facts about the Environmental Concerns"; for more information on these two reports see pages 170-175 of this issue.

## The 2012-2015 Triennium

The Council then formally confirmed Jérôme Ferrier and David Carroll as IGU's new President and Vice President with effect from the end of the 25th WGC, and Jérôme Ferrier took the floor. "I would like to thank all of you," he

said, before introducing the incoming Chair of the Coordination Committee, Georges Liens, the Vice Chair, Mel Ydreos, and Secretary, Yves Tournié. Together with the chairs of the technical committees, they were also confirmed by the Council.

A new Triennium means a new Executive Committee and elections were held. Seats on the Executive Committee are reserved for the IGU Management Team and representatives of the 11 Charter Members chairing a technical committee. This leaves six seats for other Charter Members and five seats for Associate Members. Prior to the Council meeting, the Associate Members had chosen five representatives and these were approved by the Council which then elected representatives for the six vacant seats. There were 12 candidates and representatives of Australia, Canada, China, Denmark, Norway and Qatar were elected (see page 25 for the complete list of members).

The Council next approved an application from Cyprus to join IGU. This application followed the discovery of gas offshore at the end of 2011; and the Ministry of Commerce, Industry & Tourism is the Charter Member. The Council also approved the application of a new association, Associação Portuguesa das Empresas de Gás Natural, to take over as Portugal's Charter Member. Meanwhile, as the IGU Research Conference has been brought fully into the technical committee structure, the Foundation IGRC is no longer affiliated to IGU and there are now 10 affiliated organisations.

Jérôme Ferrier and Georges Liens then took the floor to present the Strategic Guidelines and Triennial Work Programme of the incoming French Presidency for 2012-2015 (full details are given in the special section of this issue on pages 157-163). "We are a strong team and we are convinced that with all your help we will succeed," declared Jérôme Ferrier.

### **Awards and acknowledgements**

Delegates approved IGU's 2011 accounts and revisions of the Articles of Association and the Vision and Mission. They were also given a preview of the new logo prior to its formal launch during the opening ceremony of the 25th WGC.

The IGU Awards for the 2009-2012 Triennium were then presented (see *following article*). The outgoing Chair of the Coordination Committee, Ho Sook Wah, told delegates that there had been 286 submissions for the Best Practices Award. They were assessed by the Technical Programme Committee of IGRC2011, chaired by Marc Florette. A short-list of 18 was drawn up from which three winners were chosen. There were 150 submissions for the Social Gas Award and 25 for the Gas Efficiency Award, and these were assessed by a special evaluation committee.

The hard work of the 2009-2012 Triennium was recognised with Ho Sook Wah being made an Honorary Member of IGU and diplomas presented to Ungku Ainon Ungku Tahir, CC Secretary, Datuk Anuar Ahmad, Chair of the NOC for the 25th WGC, Zahariah Abdul Rahman, CEO of WGC 2012, and the chairs and secretaries of the technical committees and task forces.

Jérôme Ferrier asked the Council to confer the title of Honorary President on Datuk Rahim who declared, "It has been a privilege and an honour to serve this great organisation".

Finally, Timothy Egan, President & CEO of the Canadian Gas Association, gave a short presentation on the venue for the next Council meeting, while Datuk Anuar Ahmad welcomed Council members to the 25th WGC.

As the most senior Honorary President present, Ernesto López Anadón ended the proceedings with a vote of thanks to the Malaysian hosts.

*Mark Blacklock is the Editor-in-Chief of International Systems and Communications.*



### The President's Dinner

The President's Dinner traditionally takes place on the eve of the Council meeting and opening of the World Gas Conference. For WGC2012, it was held in the foyer of the Dewan Filharmonik PETRONAS, the home of the Malaysian Philharmonic Orchestra.



► Datuk Abdul Rahim Hashim welcomes guests.



▲▲ Datuk Abdul Rahim Hashim with incoming IGU President, Jérôme Ferrier (centre) and Tan Sri Dato' Shamsul Azhar Abbas, CEO of Petronas (ABOVE), and with Ernesto López Anadón, IGU President 2006-2009 and his wife, Ana López Anadón (BELOW).



▲▲ Guests enjoyed music during their meal and afterwards attended a concert.

# World Leader in LNG Projects

MITSUI is currently engaged in various LNG, natural gas and oil development projects all over the world. These projects require long lead time for their development and implementation. MITSUI has participated in the projects from various stages – such as starting from the initial exploration phase and partnering in LNG development.



**MITSUI & Co.**  
**LNG INVESTMENT LTD.**

MITLI has invested in the projects shown below:

## Qatargas 1 and Qatargas 3

Qatar Liquefied Gas Company Ltd. (QG1)

*17.5% interest \*, 9.6 million tons /Year +*

Qatar Liquefied Gas Company Ltd.(3) (QG3)

*1.5% interest \*, 7.8 million tons /Year +*

MITSUI is one of the foundation partners in the first LNG project in Qatar, and has established an excellent relationship with Qatar.

## Abu Dhabi GAS LNG

Abu Dhabi Gas Liquefaction Company Ltd. (ADGAS)

*15% interest \*, 5.6 million tons /Year +*

ADGAS is MITSUI's first LNG project which started production in 1977. MITSUI has also played a key role in LNG marketing to TEPCO.

## Equatorial Guinea LNG

Equatorial Guinea LNG Company, S.A (EGLNG)

*8.5% interest \*, 3.7 million tons /Year +*

EGLNG is the first project in Africa that MITSUI has invested in. EGLNG started production from 2007. MITSUI is also actively looking for expansion train (Train-2) in Equatorial Guinea with our partners.

## Oman LNG and Qalhat LNG

Oman LNG L.L.C.

*2.77% interest \*, 7.1 million tons /Year +*

Qalhat LNG S.A.O.C

*1.02% interest \*, 3.7 million tons /Year +, investment through Oman LNG)*

MITSUI is one of the Oman LNG project's foundation partners. MITSUI is fully committed to Oman upstream development and has participated in 4 blocks through Mitsui E&P Middle East B.V.

Mitsui E&P Middle East B.V. is a subsidiary of MITSUI which is ranked among the top 5 producers in Oman and will continue to proactively pursue oil and gas development opportunities in Oman.



## Experience and capability

MITSUI is uniquely placed to successfully develop LNG projects. This includes arranging multilateral international financing, concluding LNG SPA with premium world class buyers and making appropriate EPC arrangements. MITSUI has extensive experience in LNG projects and is able to effectively integrate all the necessary arrangements for current and future projects.



**MITSUI & CO., LTD.**

MITSUI has invested in the projects shown below:

### Sakhalin-II LNG

Sakhalin Energy Investment Company Ltd. (SEIC)

*12.5% interest \*, 9.6 million tons/Year +*

MITSUI is one of the foundation partners of the Sakhalin-2 project and is fully committed to oil and gas development in Russia. MITSUI is also actively looking for new investment opportunities.

### Mozambique LNG Development

MITSUI discovered significant natural gas reserves in offshore Mozambique(Area-1) with partners, which can be developed as a world class LNG project. MITSUI holds a 20% interest in the next booming project.

### Tangguh LNG

Tangguh LNG project in Indonesia

*2.3% interest \*, 7.6 million tons/Year +*

This is the first LNG project for MITSUI in South East Asia and is very important due to MITSUI's E&P assets portfolio.

### North West Shelf Australia LNG

Northwest Shelf JV in Australia (NWS JV)

*8.3% interest \*, 16.3 million tons /Year +*

NWS JV is one of the most important E&P / LNG portfolio of MITSUI and is the first LNG project in Australia promoted by a multinational consortium.

MITSUI is participating in a wide range of E&P activities in Australia – this is regarded as our core focus area.

\* % interest helds by MITSUI/MITLI in natural gas liquefaction and LNG exporting activities

+ Tons per annum production capacity.

# IGU Awards and Best Practices for the 2009-2012 Triennium

By Mark Blacklock

IGU's Awards programme aims to foster industry best practices and greater efficiency throughout the gas chain. Organising the Awards also helps to raise IGU's profile as a socially responsible organisation, to strengthen ties with academia, public sector bodies and industry, and to promote the role of gas in a sustainable energy future.

There are two categories of Award, Gas Efficiency and Social Gas, together with an evaluation of the top Best Practices. The winners for the 2009-2012 Triennium were announced at the IGU Council meeting held immediately prior to the opening of the 25th World Gas Conference on June 4.

## Gas Efficiency Award

The Gas Efficiency Award calls for new ideas and projects aimed at obtaining greater efficiency in the use of natural gas. The initial evaluation of submissions was made by a committee of experts from the Technical Programme Committee of IGRC2011 in October 2011. The best proposals were then forwarded for selection of the winner to a special Evaluation Committee with five members:

- ◆ Datuk Abdul Rahim Hashim, President of IGU (Chair);
- ◆ Maria van der Hoeven, Executive Director of IEA;

► Kunihiro Nishizaki (second left) and Kazuhiro Hirai (third left) with the IGU Gas Efficiency Award. They are flanked by Datuk Abdul Rahim Hashim and Torstein Indrebø.





- ◆ Prof. Dr-Ing. Rainer Reimert, Engler-Bunte-Institut, Karlsruhe University, Germany;
- ◆ Ho Sook Wah, Chairman of the IGU Coordination Committee; and
- ◆ Torstein Indrebø, Secretary General of IGU.

### **Winning project and authors**

“Commercialisation of a residential proton exchange membrane (PEM) fuel cell for combined heat and power (CHP), ENE•FARM”.

*Note:* ENE•FARM, derived from “energy” and “farm”, is a brand for fuel cell systems launched by the Fuel Cell Commercialisation Conference of Japan in 2009.

Kunihiro Nishizaki, Deputy General Manager, PEFC Development, Department of Technology Solutions, Tokyo Gas; and Kazuhiro Hirai, Manager, micro-CHP Development Department, Residential Energy Business Unit, Osaka Gas.

### **Summary**

The Japanese project presents a highly efficient residential CHP system using a PEM fuel cell combined with a natural gas fuel processor. The fuel cell runs on hydrogen which is produced from the city gas supply.

The technology can generate power and produce hot water efficiently with a very low environmental impact (clean exhaust, low noise and vibration). Its high efficiency allows primary energy use to be reduced by 23% and CO<sub>2</sub> emissions by 38%.

To introduce fuel cells to the domestic market Tokyo Gas teamed up with Panasonic and Osaka Gas with Toshiba and ENEOS Celltech, while the Ministry of Economy, Trade and Industry (METI) offered a subsidy of up to ¥1.4 million (\$17,500) for the 2009/10 financial year. This represented approximately 40% of the cost depending on the model. The subsidy was reduced to ¥1.3 million for 2010/11 and ¥1.05 million for 2011/12. More than 7,700 fuel cells were sold in about two years from launch to the end of March 2011. The release of a cheaper and more efficient model in April

2011 boosted sales, with 5,000 being sold in the first quarter.

The technology continues to be refined. Bringing it to the international market in the future would make a great contribution to the growth of the global gas industry.

### **Social Gas Award**

The Social Gas Award calls for new ideas and projects aimed at stimulating people to use gas more efficiently. The initial evaluation of submissions was made by a sub-committee of experts from IGU’s Programme Committee A – Sustainability in January 2012. This expert committee was chaired by Juan Puertas, Director of Engineering and Technology of Gas Natural Fenosa. The best proposals were then forwarded for selection of the winner to the same Evaluation Committee that judged the Gas Efficiency Award.

### **Winning project and author**

“Increasing vehicle conversions to dual gasoline/CNG from 150 to 100,000 in five years in Peru”.

Luis Felipe Fernández Pérez, former Commercial Natural Gas Manager, Pluspetrol Peru Corporation.

### **Summary**

This project created a fleet of motor vehicles running on compressed natural gas (CNG). It was initially focused on taxis in Lima, and was later extended to mass public transport throughout the country. The gas comes from Peru’s Camisea fields.

Four parties worked together on the project: Peru’s Supervisory Gas Council; the country’s development bank, COFIDE, which provided finance; Pluspetrol Peru, the operator of the Camisea project; and distributor Gas Natural de Lima y Callao.

The main challenges were to create a network of vehicle conversion and repair shops, dealerships and service stations, and develop a viable financing programme. To integrate all the



▶ Luis Felipe Fernández Pérez being congratulated by Datuk Abdul Rahim Hashim (above left) and with the Social Gas Award trophy and engraved pewter plate (above right).



variables involved in creating a CNG market, a centralised database was set up and connected to the CNG filling stations. A microchip was installed in the tank of converted vehicles to record each fill-up. This enabled the system to calculate a repayment amount each time the vehicle refuelled.

By encouraging the conversion of engines to use domestically produced natural gas rather than less environmentally friendly fuels, the project has reduced pollution in the transport sector. It has also helped increase the share of gas in the country's energy mix. Moreover, the project has promoted social inclusion by offering access to simple credit mechanisms to fund the conversions for people such as taxi drivers excluded from the main financial system.

### Best Practices

Submissions of Best Practices were made through the IGU Technical Committees and the Call for Papers for the 25th WGC. They were assessed by the Technical Programme Committee of the IGU Research Conference (IGRC2011), chaired by Marc Florette, Senior Vice President Research and Innovation of GDF Suez. Eighteen papers were shortlisted and three winners were chosen:

- ◆ "Optimisation of natural gas plant – gains in profitability, stability and energy efficiency", Mario Campos, Marcos Gomes, Antonio Souza and Adriano Barros from Brazil.
- ◆ "Approach for the implementation of an automatic meter reading (AMR) system for gas meters in France – GrDF project", Isabelle Drochon and Pascal Vercamer from France.
- ◆ "Development and use of ultra-strength pipes for Gazprom's trunk gas pipelines", V.V. Rusakova, T.P. Lobanova, A.B. Arabey, V.I. Bepalov and T.S. Esiev from Russia.

Each winner received a Royal Selangor pewter platter engraved with their name from WGC2012 and a certificate from IGU.

### Prizes

Each Award came with a cash prize of \$5,000 from IGU, while the Malaysian Presidency sponsored challenge trophies as a lasting legacy for the Awards and gave each winner a Royal Selangor pewter platter engraved with their name. In addition, the authors were invited to WGC2012 with free registration and travel including accommodation expenses.

*Mark Blacklock is the Editor-in-Chief of International Systems and Communications.*



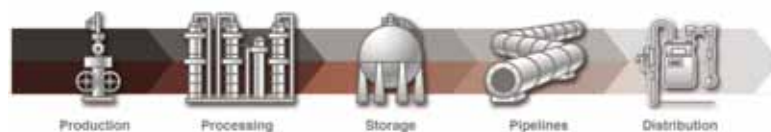
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## We're bringing better ideas to the gas industry.



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# News from Organisations Affiliated to IGU

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*In this issue we have reports from the Energy Delta Institute (EDI), Gas Infrastructure Europe (GIE), Gas Technology Institute (GTI) and NGV Global (International Association for Natural Gas Vehicles).*

## **Energy Delta Institute**

*By Eric Dam*

While the World Gas Conference celebrated its 25th edition this year, the Energy Delta Institute (EDI) celebrates its 10th anniversary.

Ten years ago, N.V. Nederlandse Gasunie, GasTerra, O.A.O. Gazprom and the University of Groningen foresaw the need to invest in knowledge and founded the Energy Delta Institute: the world's first international energy business school with a primary focus on natural gas. Over the past decade, EDI has grown into a well-established institute, where participants from all over the world can meet, interact and share knowledge. Our partner network has also grown. Today, we are supported by an international partner network of 13 founding, associated and affiliated partners.

EDI's main objective is to contribute to the professional development of current and future energy managers. In order to do so, we organise training programmes and network events with a focus on the economic, management, legal and geopolitical aspects of the energy business. Investing in knowledge and bridging the knowledge gap has become more important than ever, especially now that many senior experts are starting to leave the sector. Our ambition is to become an internationally recognised business school, linking world class sector knowledge with business skills, and combining it with academic excellence.

## **Executive education**

As it is our core activity, we continuously develop new educational programmes, driven by market demand. Our post academic programmes cover the entire energy education chain. We aim to support energy professionals in their career path during the entire length of their careers with both new and existing programmes, which are subject to constant redesign in order to keep track of recent developments.

With the financial support of the KVGN (Dutch Gas Association), we will start with the development of E-learning. Flexibility, cost savings and self-paced learning are only a few of the advantages of E-learning. The first module, which will be about gas basics, will be presented in early October 2012.

## **Network events**

EDI also provides energy professionals with opportunities to meet one another. For this purpose, we organise a variety of events, conferences, seminars and roundtable discussions. Our partners get together annually during our International Supervisory Board Meeting (founding partners only) and International Partner Meeting, to discuss our future plans and strengthen mutual bonds.

Sharing knowledge is not only conducted between and among our business partners; EDI also provides energy professionals with opportunities to meet one another. For example, we regularly organise special events for ambitious young professionals. For the decision makers of the industry, we organise a conference on energy transition. In order to keep track of latest developments, we offer short knowledge sessions, called EDI dialogues.



### WGC and CEO interviews

Besides organising our own events, we are also visible at other events. As an organisation affiliated to IGU, we were present at the 25th WGC. Under the slogan “The Power of Dutch Gas”, EDI was one of the eight Dutch companies to present itself on the Dutch Pavilion, to more than 10,000 energy professionals from all over the world.

During the WGC, we conducted several interviews with a number of prominent representatives, offering exhibition visitors the opportunity to meet and listen to some of the industry’s most senior thought-leaders.

We interviewed 19 industry leaders on what they perceive as the biggest challenges and opportunities for the gas industry over the next 20 years, and how they see the market share of gas evolving over this time period.

Seven of the 19 interviewees cited the political acceptance of gas as a challenge to the industry, and recommended that advocacy efforts be sustained or increased in order to increase its acceptance. Six of the interviewees indicated that the image of shale gas could influence the industry as a whole, and most indicated that care should be taken to ensure best practices are followed in exploitation of all types of gas resources. Uncertain and/or unjustifiable intervention by regulators was cited by five as representing a large challenge. One interviewee indicated that “the authorities are still trying to liberalise the market” when in fact the measures they are taking actually represent a threat to the free market. Four individuals cited a lack of investment and infrastructure as holding back the industry in the future, and other concerns included lack of demand in Europe, lack of good personnel, security of supply and, significantly, a lack of innovation in new applications for gas was cited as a concern by two interviewees.



### The greatest opportunities for gas

Five interviewees cited the positive environmental characteristics of gas versus other fuels and its suitability for a transportation fuel as being among the largest opportunities for gas, and four emphasised the opportunities availability in power generation. Natural gas is expected to first penetrate the market for long distance and heavy transport (trucking in place of diesel, shipping in place of bunker fuel) and then move toward light transportation. One interviewee expressed his opinion that a transport sector where electricity and gas cooperate can exhibit synergies with electric mobility in the cities for short distance light transport and gas (CNG and LNG) for longer distance, heavy transport. One of the largest advantages of increased natural gas penetration in transport and power generation is expected to be its lower emissions in terms of NO<sub>x</sub>, SO<sub>x</sub>, particulates, than the fuels it replaces (coal, diesel, etc.) and the positive implications for local pollution. Further positive aspects of gas cited included its flexibility, large reserves, easy transport and storage, complementarity with renewables, and its cleanliness.

▲ Marius Popescu, Energy Analyst at EDI in an interview with Jérôme Ferrier, Senior Vice President of Corporate Security at Total and incoming IGU President.

► IGU President, Datuk Abdul Rahim Hashim with the first copy of EDI's report flanked by Eric Dam (left) and Marius Popescu (right).



All interviewees except for one indicated the share of natural gas in energy consumption is expected to grow in the next 20 years. Four indicated that it would reach a share of 25-30%, and four indicated it would reach 30-35%, with the others stating no concrete number. Interviewees were careful to point out that even an increase of a few percentage points has enormous implications regarding the advocacy efforts, and additional infrastructure and investments required.

The interviews, with the participation of Alexander Medvedev (O.A.O. Gazprom), Paul van Gelder (N.V. Nederlandse Gasunie), Gertjan Lankhorst (GasTerra), Dick Benschop (Shell), Marc Hall (Bayerngas), Marcel Kramer (South Stream), Jérôme Ferrier (Total) and many others, are being broadcast on our new online community for energy professionals, Syntropolis, and on EDI TV on Youtube.com.

▼ Syntropolis was launched during the 25th WGC.

### Launch of Syntropolis

Syntropolis was officially launched during the WGC to bring together energy professionals from all segments of the industry and provide an infrastructure for the exchange of ideas, perspectives and visions. With Syntropolis, we provide our partners and the energy sector at large with an infrastructure where users get the opportunity to post content like events, jobs, courses and media. Visit us at [www.syntropolis.net](http://www.syntropolis.net) and let us know what you think.

### Report

Last autumn, we conducted a market survey on the required skills and competencies needed for our future energy leaders. About 40 CEOs and top managers from the industry participated in this survey. The first copy of the report, "What it takes to be a Successful Executive in the Energy Industry" was handed over during the WGC on June 4, to Datuk Abdul Rahim Hashim, IGU President. Visit our website to read more about the report or contact us to get a copy.

### The Interactive World Gas Map

In 2010, together with IGU, we started the construction of an Interactive World Gas Map on our website. At the WGC, we launched the upgraded World Gas Map, which contains the latest content on natural gas. Besides a range of related videos, the map and the country gas profiles offer key statistics on more than 50 countries, natural gas reserves, exploration and production, infrastructure, imports/exports, supply and demand, LNG, unconventional gas, regulation and CO<sub>2</sub> emissions.

The 25th World Gas Conference was a very successful event for EDI; we already look forward to the next WGC in Paris in 2015.

*Eric Dam is the President of the Energy Delta Institute ([www.energydelta.org](http://www.energydelta.org)).*





# Congratulations to all in the IGU

The Royal Dutch Gas Association-KVGN will be 140 years old in 2013!

As Founder and Charter Member, the KVGN has a partnership of more than 80 years with IGU. This is a valuable part of our Dutch gas history, and on behalf of the Dutch Gas Industry we congratulate all IGU members on the celebration of IGU's 80<sup>th</sup> anniversary in 2011, and on holding the 25<sup>th</sup> World Gas Conference in 2012!

*Our joint history and the WGC are a strong foundation for an even brighter future for gas. You can count on the support from the Dutch in making it happen!*

80 years IGU  
25<sup>th</sup> WGC



energy in motion



[www.kvgn.nl](http://www.kvgn.nl)



[www.gasum.fi](http://www.gasum.fi)

## Brighter outlook for tomorrow

The combined heat and power (CHP) production is vital for Finnish society. In the near future new natural gas based technology is taken use in metropolitan area waste processing which is an important step towards carbon-less energy production. Opting for natural gas instead of coal helps cut down CO<sub>2</sub> emissions and improve local air quality.

**Gasum**

## Building Gas Infrastructure for a Transparent, Competitive and Secure EU Gas Market

By Abel Enríquez

The Energy Roadmap 2050, the Energy Infrastructure Package and the completion of the internal gas market are the three policy projects with which European institutions are shaping the short, medium and long-term future of the European gas market.

Starting with the most immediate future, we see that the Third Package is being implemented and that the European Network of Transmission System Operators for Gas (ENTSOG) and Agency for the Cooperation of Energy Regulators (ACER) are working intensively to achieve as soon as possible the single internal gas market. However, for a truly internal gas market, we not only need the right rules (the software) but also new gas infrastructure (the hardware). This hardware has to be built quickly and efficiently, without administrative barriers and in a period known in advance. Gas infrastructure represents less than 10% of the European consumer's bill. Still, investments in infra-

structure have to be optimised in order to maintain gas competitiveness and preserve its value.

Regarding the long-term future, one could draw the conclusion from the Energy Roadmap 2050 that renewables are the winners of the future EU energy policy. Concerning gas, even if it will have a relevant role in the medium-term, its role for the long-term remains unclear.

The lack of long-term visibility for the gas industry is something that the gas industry cannot accept. Gas infrastructure is a long-term, capital-intensive business – the gas infrastructure which will be used by 2050 is being built today. For this reason, a sound investment climate is needed. Gas infrastructure operators need stable and predictable regulatory frameworks, but first of all, they need visibility over the coming decades. They need to attract investors and therefore strong signals from the EU policymakers, recognising the fundamental role that gas will play by 2050 and beyond, are required. This involves also the right design of the EU climate policy, in particular the Emissions Trading System (ETS), which should guarantee appropriate carbon

▼ GIE's Annual Conference 2012 gathered a record number of more than 350 delegates.





price signals allowing a proper valuation of the different energy sources, including natural gas. Without due consideration of these aspects and positive EU policy signals, investments in gas infrastructure will not take place.

Furthermore, GIE sees that natural gas and electricity are more and more interlinked; this makes gas the ideal partner for variable renewables allowing their development and integration. If renewables are going to be developed, natural gas infrastructure will have to be developed too.

For all these reasons, GIE in cooperation with six other gas associations launched the GasNaturally campaign. GasNaturally aims at showcasing the crucial role of gas in the EU energy future. For the first time in history we are seeing the gas industry acting together and speaking with a single voice, and this, for GIE means that the gas industry is progressing in the right direction.

GIE is fully convinced that if Europe wants a more secure, more sustainable and more competitive gas market then, Europe needs much more gas infrastructure.

### **Activities of GIE**

The various GIE activities are mostly driven by the EU policy developments as well as by the goal to promote natural gas and gas infrastructure. GIE continues being a key stakeholder in the European Gas Regulatory Forum, the so-called "Madrid Forum", as well as in the Gas Coordination Group. GIE is represented in the Thematic Network on Critical Energy Infrastructure Protection and gives its members a platform to exchange information on security issues for gas transport throughout Europe.

Each year, GIE organises a conference focusing on important energy policy and gas infrastructure topics, which always attracts many market players. This year, the GIE Annual Conference 2012 (hosted by Gaz-System in Krakow in May) gathered a record number of more than 350 delegates. Next year, the GIE

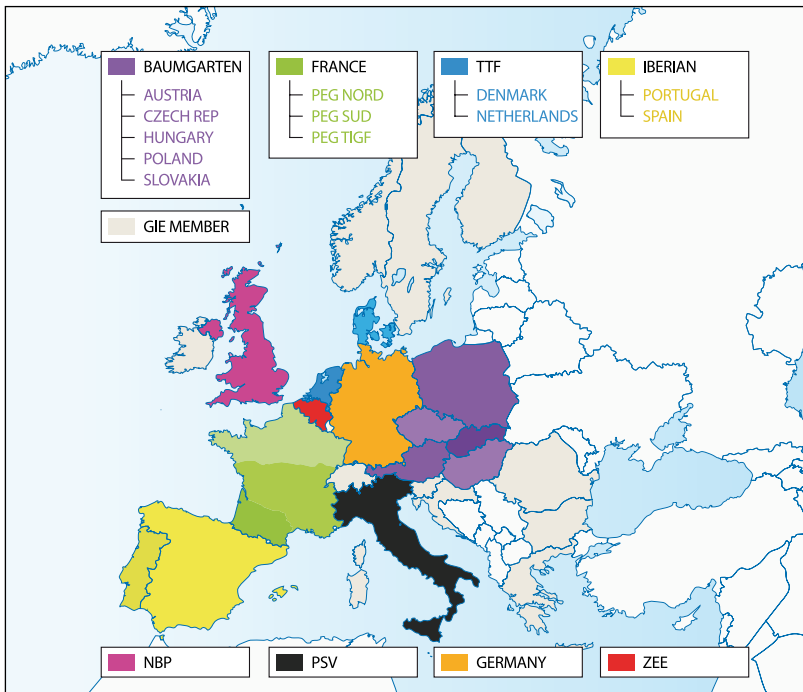
Annual Conference 2013, which will be hosted by SNAM, will take place in Venice from May 23-24. It will feature interesting speakers from across Europe who will discuss how to facilitate the building of necessary gas infrastructure as a highway to a low-carbon economy.

GIE is in regular contact with other associations and is looking at areas of common interest with ENTSOG, Eurogas, the European Federation of Energy Traders (EFET) and Marcogaz, to name just some of our important partners. As regards cooperation with IGU, GIE and its members are active in IGU activities, ensuring that the important role infrastructure plays in the gas industry is reflected in IGU's work and its related activities. GIE attended the 25th World Gas Conference in Kuala Lumpur in June and has been participating in the Council meetings in recent years.

Within GIE, there are a number of working groups which develop diverse activities. In addition, GIE's three divisions (Gas Transmission Europe – GTE, Gas Storage Europe – GSE and Gas LNG Europe – GLE), are also carrying out their own initiatives and activities. The following is a brief summary of the main activities developed since our last contribution to the IGU Magazine in the April 2011 issue.

An increasing number of active GIE groups have been dealing with a variety of topics and initiatives. To focus on some of the most relevant ones, GIE has, since March 2011, continually increased its communication activities both externally and internally. During the last two years, GIE has been an active contributor to the EU legislative process of the so-called Energy Infrastructure Package which is of paramount importance for GIE members. For this purpose, GIE is in permanent contact with the European Commission and has published a number of papers to feed the drafting process in the EU institutions.

GIE has also been contributing to public consultations of the EU institutions and EU regulators to voice the views of its members,



▲ GSE's AGSI initiative publishes a daily gas storage inventory by country.

with special attention being focused on the lobbying activities for the Energy Roadmap 2050. For this dossier, apart from being in contact with the EU institutions, GIE published a special brochure and a video-message, available on the GIE website. GIE also decided to be a founding member of the GasNaturally campaign ([www.gasnaturally.eu](http://www.gasnaturally.eu)) in order to develop further lobbying activities in relation to the Energy Roadmap 2050.

As regards internal communications, GIE has launched different initiatives including a monthly newsletter and a training course on EU processes and EU legislation for its members. The GIE website has been enhanced with the development of a Knowledge Centre and a tool for EU regulatory developments, keeping members informed about the different ongoing processes.

### Gas Transmission Europe

GTE's current activities focus on general topics and initiatives concerning gas infrastructure market developments, such as the EU's Regulation on Energy Market Integrity and

Transparency (REMIT) or the Energy Roadmap 2050. Special and dedicated tasks have been transferred to ENTSOG, since ENTSOG has the legal obligation to develop the necessary alignments for creating a single European gas transmission market. GIE will continue to develop lobbying activities for all the infrastructure operators in Europe, including its GTE members.

### Gas Storage Europe

GSE focuses on the promotion of the gas storage business as a main contributor to a low-carbon economy. In recent years, GSE has been also working to improve both transparency and the security of gas supply to Europe whilst ensuring a proper investment framework in the EU. Since our last article in the IGU Magazine, the GSE Aggregated Storage Inventory Levels (AGSI<sup>1</sup>) initiative has undergone new enhancements with the disaggregation of data by country (rather than aggregated data per hub area covering groups of countries) and the provision of historical information.

Transparency has always been an important issue for GSE. The AGSI initiative and map are the main pillars of GSE's policy activities. Moreover, in mid-2012, GSE commissioned an independent survey among the EU storage system operators about "Transparency requirements concerning storage facilities and LNG facilities under Article 19 of Regulation EC 715/2009". The conclusions of this initiative will be shared with the Madrid Forum and will serve, together with other work, as a basis for further initiatives by GSE.

The Guidelines of Good Practice of Storage System Operators (GGPSSO) on Capacity Allocation Mechanisms (CAM) and Congestion Management Procedures (CMP) is another topic that GSE has been dealing with during the past

<sup>1</sup> AGSI is a voluntary initiative from the GSE members to publish the storage facilities' inventory levels, as well as injection and withdrawal flowrates, on an aggregated basis per hub area ([www.transparency.eu](http://www.transparency.eu)).



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year. GSE is in permanent contact with the EU regulators, and has approved an internal guideline for implementation of the GGSSO provisions. GSE's activity on gas quality issues should be also highlighted. The specifics of storage regarding gas quality (i.e. bio-methane, oxygen) are crucial. GSE and GIE published position papers on Gas Quality Harmonisation last year and both stress this point. GSE members, through GIE, will continue contributing actively to the work of the European Committee for Standardisation (CEN).

### Gas LNG Europe

The importance of LNG in the European gas market as a significant contributor to security and diversification of supply is increasing. GLE is continuing its efforts to promote recognition for LNG infrastructure activities at the European level as well as the proper legislative and regulatory framework for the LNG industry in Europe. While doing so, GLE seeks to ensure that LNG business specificities are taken into account in any future EU regulatory developments.

In recent years, GLE has been working intensively on a range of topics such as access conditions to EU LNG terminals, the development of small-scale LNG and cooperation with other LNG-related international associations. GLE has also performed lobbying and communications activities on behalf of its members. These include the publication of specific brochures, the release of a new edition of the GLE map, presentations to the EU Gas Coordination Group (GCG) and the organisation of dinner-debates at the EU Parliament.

As part of its work, GLE has successfully implemented the GLE Transparency Template among all its members. This transparency initiative was developed in cooperation with the Council of European Energy Regulators (CEER) and was presented and discussed at the Madrid Forum. Local system operators (LSOs) are currently publishing the right level of information on their websites, in particular that requested by Regulation 715/2009. However, to promote access to any European LNG terminal CEER proposed that GLE develop a common facilitating tool to make the existing information more readily available to the market. Thus, GLE members have agreed to implement on a voluntary basis a common Transparency Template to facilitate access to this great amount of information.

The Transparency Template is a harmonised information template which is installed on a relevant page of each LSO website. It allows visitors to be easily directed via hyperlinks from macro areas and sub-menus to the necessary information. The template respects the diversity of business models and regulatory conditions, but makes the existing information in LSO websites more accessible to the market. For more information about the GLE Transparency Template, please visit [www.gie.eu/index.php/maps-data/gle-transparency-template](http://www.gie.eu/index.php/maps-data/gle-transparency-template).

*Abel Enriquez is Executive Secretary of GIE (www.gie.eu).*

### LNG Terminals Transparency Template



Macro Area	Sub-menu
1 CONTACT	Contact
2 TERMINAL CHARACTERISTICS	Facilities main characteristics
	Service description
	LNG quality
3 HOW TO BECOME A CUSTOMER / USER	Main steps for applying for access
	Contract information
	TSO information
	Ship procedures
4 CAPACITIES	Primary market
	Secondary market
5 TARIFF	Regulated terminals
	Exempted terminals
6 LEGAL DOCUMENTS	Contracts/codes
	Regulation/legislation
7 OPERATIONAL DATA	Historical data
	Operational data
8 MISCELLANEOUS	Projects

The GLE Transparency Template was developed in cooperation with CEER.





# TAKING STEPS TOWARD FUTURE ENERGY NEEDS

BG Group's strategy is focused on connecting competitively priced resources to specific, high-value markets. Active in more than 20 countries on five continents, we have a broad portfolio of exploration and production, LNG and transmission and distribution business interests. We combine a deep understanding of gas markets with a proven track record in finding and commercialising reserves.

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[www.bg-group.com](http://www.bg-group.com)

BG GROUP





▲ China is already producing tight gas (the Changbei field is pictured) and CBM, and is now being hailed as one of the next big shale gas regions.

### **Making Unconventional Gas Resources Productive Through Advanced Technology and Collaboration**

*By Trevor Smith*

Energy resources to produce clean fuels are available worldwide in plentiful supply, and technology is critical in bringing this abundant resource to market. The unconventional gas revolution in the US was brought about by bringing together the right partners and technology-based solutions to make these resources productive.

The world has within its grasp the possibility of realising energy security, economic prosperity and environmental sustainability – on a national, regional and global scale – by understanding and utilising vast unconventional gas resources. Critical to unlocking gas shales, tight gas sands and coal-bed methane (CBM) has been and continues to be collaboration and advanced technology, which enable solutions to be identified, developed and deployed that reduce the risks and costs of production and minimise the environmental footprint of developing these vital resources. No two unconventional gas plays have the same geological character-

istics, so technology known to work effectively in one play may have to be adapted or re-invented altogether to make another play productive and economical.

### ***World shale gas potential***

The worldwide pursuit of unconventional gas including gas shales has only just begun. The latest study of world shale gas potential came from the US Energy Information Administration (EIA) performed by Advanced Resources International (ARI) in 2011. EIA estimated that 187.5 tcm of technically recoverable shale gas existed in the 48 shale gas basins in the 32 countries it assessed. A true “bottom-up” assessment country by country is required as a next step in refining and validating this potential.

Europe’s unconventional gas resource endowment and supply potential are large and production holds promise. Exploration is underway in several European basins including the Alum Shale of Sweden, the Silurian Shale of Poland, the Posidonia Shale in Germany, the Carboniferous sediments in The Netherlands and Germany and the Mikulov Shale of Austria. Several companies are also seeking permits for shale gas prospects in southeast France in Languedoc-Roussillon, the Cevennes mountains region and the Savoie area near the Swiss border. Poland is the furthest along in exploring for shale gas and may become the first European country to realise commercial production.

However, in addition to social and environmental considerations, Europe’s geology is challenging. Therefore, collaboration and the development and deployment of technology-based solutions tailored to each play is crucial for making Europe’s unconventional resources economically productive, environmentally sustainable and socially acceptable.

China is being hailed as one of the next big shale gas regions. Various reports have indicated that China has potential reserves of between 144.4 and 495.5 tcm with possibly 36.1 tcm being technically recoverable. The



recently published Shale Gas Development Plan jointly issued by the National Development and Reform Commission, Ministry of Finance, Ministry of Land and Resources and National Energy Administration has highlighted an objective of proving a shale gas resource of 600 bcm and a recoverable reserve of 200 bcm with annual production of 6.5 bcm by 2015. To achieve this objective, the industry will need to collaborate on best practices and innovation of new technology, agree on effective business models, develop the resource efficiently, and define and clarify the legal and regulatory frameworks to enable rapid and sustainable development of shale gas.

In 2010, Petrochina began collaborating with international companies such as Shell, Chevron and Hess on joint studies and launched shale gas pilot developments in the provinces of Sichuan and Yunnan. The first shale gas appraisal well was completed in the south of the Sichuan Basin and commercial gas flows were obtained.

Unconventional gas exploration is underway in many other parts of the world, including Australia (a global leader in CBM production), New Zealand and southern Africa, and there are also initial efforts underway in Venezuela, Argentina and Chile to understand the resource potential of tight sands and gas shale.

As development occurs, it opens up tremendous opportunities for energy security, reducing climate change risk and providing economic prosperity through wealth and job creation and capital investment. The potential benefits of developing global unconventional gas are not guaranteed. There are distinct and diverse challenges facing each of these resources in addition to the need for technology transfer and support. Collaboration between producers, service companies, NGOs, policymakers, thought leaders, industry associations, universities and investors combined with the right



advances in technology will be crucial for these resources to reach their full potential.

▲ More than 200 delegates attended the GUG summit in 2011.

#### *GTI and the GUG Summit*

The Gas Technology Institute (GTI) has played a key role in the unconventional gas revolution in North America. Development was launched in the early 1980s with the help of a large collaborative research programme led by GTI. Their effort along with efforts by other organisations, notably the US Department of Energy, became a catalyst for experimentation and new technology development that has unlocked the vast

▼ Further information on GTI's latest GUG summit can be found at [www.gug2012.com](http://www.gug2012.com).





► This recent GTI report looks at shale gas water management.

potential of America’s “new” natural gas and provided the world with a promising new energy future.

GTI is now working to share that experience with the rest of the world. One important initiative underway is the Global Unconventional Gas (GUG) Summit: Realising Your Potential scheduled for November 6-8, 2012 in Beijing, China. This is the third annual session of the conference, geared at senior energy executives looking to find out more about the application of unconventional gas techniques. The event builds on the success of the 2010 conference in Amsterdam, The Netherlands, and the 2011 conference in Beijing, China, which focused on exchanging ideas on the enormous global potential of gas shale and unlocking unconventional gas resources in an environmentally and economically sustainable way.

#### **Workshops and reports**

GTI has delivered customised workshops on best practices and technological solutions for effective unconventional gas development and

produced water management to European producers and service companies. Numerous papers and presentations have been made across the nation and around the globe – including Austria, Poland, Istanbul, France, The Netherlands and Korea – to share our expertise and advocate for unconventional gas development.

A recently completed and published report, “Techno-economic Assessment of Shale Gas Water Management Solutions” (GTI-12/0004) is available for sale on GTI’s website at [www.gastechnology.org](http://www.gastechnology.org). The report defines best water management practices and emerging solutions, maps them according to GTI’s flow sheet model, identifies gaps in technology development and determines cost reduction and efficiency opportunities taking account of full life-cycle costs. It is intended to assist readers in identifying near- and long-term cost savings, reducing commercial uncertainty and preventing issues associated with water use from becoming an obstacle to the sustainable development of vital unconventional gas resources.

#### **Working together**

The key to unlocking unconventional gas is to work together and develop advanced technology. Abundant, affordable and clean energy can be produced environmentally and economically sustainable way. New tools, data and thought leadership will help to ensure the safe, economical and responsible development of global unconventional gas and provide tremendous opportunities to take advantage of the many positive attributes of natural gas.

*Trevor Smith is Program Manager at GTI – a leading non-profit research, technology development and training organisation solving important energy and environmental challenges for the global natural gas and energy industry for more than 70 years ([www.gastechnology.org](http://www.gastechnology.org)).*



# Many Viewpoints **One Vision**



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Scientific curiosity and technical innovation have been part of the Schlumberger culture for more than 80 years. Today, these characteristics lie at the foundation of our vision of helping customers improve performance and reduce technical risk in oil and gas exploration and production, water resource development, and carbon dioxide storage.

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## NGV Global

By Brett Jarman

NGV Global 2012 will be held in Mexico City, November 6-10. This will be the 13th biennial conference and exhibition of NGV Global. Earlier this year, the NGV Global Board of Directors took up an opportunity to reschedule and relocate the event to Mexico in November. Mexico is a relatively new NGV market but due to the rapid rise in local and nearby business opportunities, the proposal to relocate proved compelling. The decision has since been justified with more than 90% of exhibition space sold out within four months of the announcement being made.

### *Mexico – opportunities big and small*

With an abundance of natural gas available, and chronic air quality problems affecting Mexico's citizens, the appetite for natural gas vehicles in the country is strong. Mexico City alone has more than 110,000 taxis, most of which are viable candidates for operations on natural gas.

Unlike most other Latin American markets though, Mexico also looks set to include heavy-duty vehicles in its new wave of NGVs.

Hyundai Truck and Bus, a major sponsor of NGV Global 2012, have committed to only supply CNG buses to the Mexican market. And at a recent national freight forum, major truck manufacturers including Navistar, MAN, Kenworth, Freightliner, Volvo, Hyundai, Foton, Hino and Isuzu, reportedly voiced an interest in and intention to introduce NGV products to Mexico.

Local gas companies are also voicing a strong commitment to establish CNG refuelling infrastructure to service demand.

### *Conference and exhibition*

The conference will bring local and international stakeholders together to progress local market development, discuss trends in technology and policy and to exchange success stories from around the globe.

Confirmed speakers include representatives from the United Nations, International Maritime Organisation, Westport Innovations (Canada), Hyundai Truck and Bus (Mexico), Clean Air Power (USA), Dina Cummins (Mexico), Volvo Trucks (Sweden), Honda R&D (Japan), Gas Natural Fenosa (Mexico), VTT (Finland) and Gazo (Mexico), with more to be announced soon.

The conference is supported by a three-day trade exhibition with representation from all sectors of the industry.

Also included this year is an open Technical Forum on the day before the conference commences. Chaired by NGV Global's Technical Chair, Dr Alex Lawson, the session will explore technical issues in a more detailed and informal forum than normal conference sessions allow. One of the technical issues of particular interest to the gas industry will be discussions on gas quality and composition and how the industry can meet the needs of vehicle and engine manufacturers who need consistent fuel quality for their engines.

Registrations are open now and more details about NGV Global 2012 can be found at [www.ngv2012.com](http://www.ngv2012.com).

### *IGU NGV Global Board representation changes*

With the handing over of the IGU Presidency in Kuala Lumpur in June, IGU's representation on the NGV Global Board also changed. Mr Ho Sook Wah, who served as the Chair of the IGU Coordination Committee during Malaysia's Triennium ended his three-year term representing IGU and Mr George Liens of France, the new Coordination Committee Chair, assumed the NGV Global Board position.

▼ This year sees NGV Global's 13th biennial conference and exhibition.



**NGV GLOBAL**  
**2012**  
MEXICO CITY, MEXICO

In Partnership with







IGU's board representation demonstrates the importance of the reciprocal relationship NGV Global shares with IGU and we take this opportunity to thank Mr Ho for his contributions and active engagement during his term on our Board.

At a recent Board strategy session, developing the IGU relationship further was one of the key strategic initiatives identified and we look forward to actioning this and working with Mr Liens and the IGU Secretariat and membership during the coming triennium.

#### **Gas quality and composition**

One of the specific issues we hope to engage with IGU members on in the short- to mid-term future is gas quality and composition. With vehicle and engine manufacturers having very specific fuel quality requirements, we are hoping to work with the industry to identify means of improving gas consistency, particularly for vehicles moving through different regions. This is a complex issue but we are confident that we will be able to at least find some partial solutions to it. We will have more specific comment on that in a future issue.

#### **IGU Study Group 5.3 report**

We also take this opportunity to congratulate the team of IGU's Working Committee 5, Study Group 3 for the outstanding work in putting together their report for the 2009-2012 Triennium. Prepared under the chairmanship of Eugene Pronin (Gazprom/NGVRUS) jointly with the UN Economic Commission for Europe's Working Party on Gas, the report once again represents hundreds of hours of research and compilation and provides a comprehensive resource for the industry. We're always impressed by the work that goes into these reports and encourage industry members to contribute to this process.

#### **Revitalised knowledge base**

Following a long overdue technical and design overhaul, we have recently relaunched our [www.iangv.org](http://www.iangv.org) website, positioning it as an industry knowledge base.

New features on the site include a comprehensive archive of more than 400 industry reports and presentations and a newly introduced country report section with details on country developments, statistics and policy

▲ Hyundai will be supplying CNG buses like this Super Aero City model (pictured in service in Peru) to the Mexican market.



▲ The world's NGV fleet is growing rapidly.

updates. The current content serves as a foundation only and will be added to on a weekly basis.

The intention of the site is to make it the first port of call for anyone interested in finding out about natural gas vehicles.

**More than 15 million NGVs on the road**

One of the first content updates on the new site was the publishing of our year-end 2011 industry statistics. Altogether, NGV Global's data counted 15,192,844 natural gas vehicles across 84 countries at the end of 2011, rising from the end-2010 figure of 12,674,402. That represents growth of 19.9% over 2010, 33.7% since 2009, and 22.9% average annual growth over the past decade.

Additionally, the number of natural gas filling stations has increased from the end-2010 figure of 18,202 to 19,941, growing 20.8%.

Despite severe economic turmoil around the world over recent years, the NGV count continues its exponential growth, almost in line with NGV Global's projections of 2006. In fact, actual sales through 2011 exceeded those projections – 2.576 million actual versus

2.495 million projected – more than doubling 2010 sales. Continued strong growth in Asia and the opening up of the North American market with domestic production of NGVs now occurring will likely see that growth projection remain true.

*Brett Jarman is the Executive Director of NGV Global ([www.ngvglobal.org](http://www.ngvglobal.org)).*

► NGV Global works closely with IGU – NGV Global's Chairman Gabriele Gozzi took part in a strategic panel during the 25th World Gas Conference in June.





# Innovation for the Future



Westport Innovations Inc. (Westport) is the global leader in the development and commercialisation of proprietary solutions that allow engines to operate on clean-burning fuels. Westport technology helps reduce greenhouse gas emissions for a range of engines that power everything from forklifts and passenger vehicles to locomotives and mine-haul trucks.

## Market Strategy

The natural gas vehicle (NGV) industry is growing quickly. According to the International Association of Natural Gas Vehicles, there were more than 15 million NGVs in use worldwide at the end of 2011, including about 123,000 operating on US roads. IANGV projects more than 50 million NGVs worldwide within the next 10 years – almost 10% of the world

transportation fleet. Westport works with original equipment manufacturers worldwide to commercialise technology in markets where demand for clean, low-emission engines is prevalent, including light-duty, medium-duty, heavy-duty and high horsepower applications.

## Global Solutions

Westport operations span the globe, with facilities and offices in 10 countries, responsible for market and partner development, product research and development, engineering, testing, assembly and manufacturing. Our staff of more than 900 people support a number of business units, including but not limited to Westport LD, Cummins Westport and Westport HD. Partnerships are important to the success and development of Westport and we work closely with

supply chain partners to produce fuel systems components that meet Westport's exacting standards for quality and sustainability. Our supply partners are chosen through a rigorous selection process.

## In Our Community

As a global leader in clean technology, we recognise the responsibility we have to our employees, customers, partners, shareholders, suppliers, academic institutions, non-governmental organisations, and the natural environment. We believe in contributing to the communities and neighbourhoods where we live, work and operate. The Westport employee leadership team drives community engagement and community enrichment, and coordinates the volunteer efforts of Westport employees based on the causes and issues championed by staff.



## The global leader in natural gas engines.



Westport Innovations is a global leader in natural gas engines, shifting the world away from its reliance on oil-based transportation fuel to a more sustainable energy future. Our operations span the globe, with facilities and offices in 10 countries, and more than 900 people responsible for product research & development, engineering, testing, assembly and manufacturing.

We work closely with partners in the natural gas and transportation industries to support the ongoing global growth of natural gas vehicles. We believe that developing fuel systems, service and support solutions, and natural gas supply for use in transportation will benefit everyone along the supply chain and ultimately the consumer.

As large deposits of natural gas are being discovered in regions with high transportation fuel demand, more vehicle manufacturers and owners are recognizing the benefits of adopting natural gas vehicles through lower fuel costs, increased energy security, and a cleaner burning fuel that's better for the environment.

Join Westport and a progressive alliance of companies, governments and organizations around the world that are part of a global transition to natural gas / methane-powered vehicles as way to recognize cost savings and emission reductions. Westport is the only company in the world to develop and commercialize a range of alternative fuel technologies for vehicles extending from passenger cars through to mining trucks and locomotives.

## We look forward to seeing you at LNG 17 in Texas in 2013!

# Houston Prepares for LNG 17

By Mark Blacklock



The world's leading liquefied natural gas forum is the LNG X series of conferences sponsored by IGU, the Gas Technology Institute (GTI) and the International Institute of Refrigeration (IIR). The first was held in 1968 and they have settled into a three-yearly cycle. For the 17th International Conference and Exhibition on LNG in 2013, the baton has been passed to the USA and IGU Charter Member the American Gas Association.

"LNG 17 will be held in Houston, Texas, April 16-19 and will be the largest global gas event in 2013," says Jay Copan, Executive Director of the National Organising Committee (NOC). "It is the only LNG event produced by the industry for the industry."

The venue for LNG 17 will be Houston's George R. Brown Convention Center. A record 5,000 delegates from 80 countries are expected to attend and the exhibition is also set to be the largest yet.

The LNG 17 conference programme has been broadened in scope to reflect the dramatic

ongoing strategic changes occurring in the LNG markets, and to attract new delegates who did not attend previous LNG conferences. It has been developed by the LNG 17 Programme Committee, a 44-member team of LNG experts from around the world, supported by the conference organiser, the CWC Group.

"The rapidly evolving nature of the LNG industry and our experience in producing successful LNG conferences identified a need to expand the scope of the conference programme. The new sessions and features will reinforce LNG 17 as the pre-eminent event for all levels of the LNG industry and as such will attract the largest gathering of LNG professionals ever," says Lisa Shelton, Director of the CWC Group.

"We received a record number of abstracts," says Dr Nirmal Chatterjee, Chairman of the Programme Committee. "The total of 421 was over 100 more than the previous record. If we had maintained our traditional number of sessions many outstanding abstracts would have had to be rejected."

The total number of sessions has been increased from 12 to 17 with two more paper sessions and three more workshop sessions. Moreover, the format of some of the workshop sessions has been changed to include both formal papers and a traditional workshop. The LNG 17 conference programme will have 78 papers (compared to 49 previously) and 98 posters (vs. 60 to 65.) In addition, 10 reserve papers have been selected.

"To develop the new topics, we added 10 new members to the Programme Committee," explains Dr Chatterjee. "They brought in very different LNG expertise covering areas such as

▼ The LNG 17 team at the 25th World Gas Conference.







◀ The venue for LNG 17 is Houston's George R. Brown Convention Center.

the operation of small plants, new LNG applications and financial, legal and academic issues. They developed an outstanding set of new sessions and we have organised the programme in such a way that there will be minimum conflict of interest between the commercial, technical and new topics. There also will be effective continuity between papers and workshops as well as between the spotlight sessions and the daily conference sessions.”

### Final programme

The LNG 17 plenary sessions include a new Global Strategy Forum on the first day and six spotlight sessions featuring speakers who will address the most significant trends, challenges and opportunities facing the industry. Confirmed senior-level speakers include Hamad Rashid Al Mohannadi, Managing Director of RasGas Company Limited, Maria das Graças Silva Foster, CEO of Petrobras, Alexander Medvedev, Deputy Chairman of Gazprom's Management Committee, Betsy Spomer, Head of Global LNG at BG Group, and Daniel Yergin, Chairman of IHS CERA and a member of IGU's Wise Persons Group.

The conference programme will have nine formal paper sessions, three traditional workshop sessions, four hybrid paper and workshop sessions and a poster session:

### Paper sessions

- ◆ New Markets and New Projects (this will be the lead-off session with no other session in parallel)
- ◆ Commercial Trends
- ◆ Market Dynamics
- ◆ People, Projects and Resources
- ◆ Floating LNG Facilities
- ◆ Developments in Liquefaction, Machinery, etc., in On-shore Facilities
- ◆ Safety, Health and Environment
- ◆ Terminals, Tanks and Tankers
- ◆ Peak Shaving, Satellite Operations and Small Scale LNG

▼ Jay Copan, Executive Director of LNG 17 (second right) receiving the conference banner at the end of LNG 16.





▲ Sabine Pass is the world's largest regasification terminal with a capacity of 113 mcm/day and is adding liquefaction trains for export.

#### Workshop sessions

- ◆ Technical Innovations for the Future of LNG
- ◆ Globalisation of LNG and the Emerging Markets
- ◆ Unconventional Gas as a Resource for LNG

#### Hybrid paper/workshop sessions

- ◆ Structuring a Successful LNG Project: Financial, Regulatory and Contractual Planning
- ◆ LNG as a Transportation Fuel
- ◆ Building a Resilient Supply Portfolio in a Changing World
- ◆ Role of LNG in Meeting Growing World Gas Demand

#### Poster session

(A single three-hour session with no other session in parallel)

- ◆ Process and Plant Design and Optimisation
- ◆ Machinery Development
- ◆ Materials and Equipment Development
- ◆ Instrumentation, Control and Optimisation
- ◆ Operational Excellence
- ◆ Safety and Environmental Management

#### Key dates

November 5, 2012	Deadline for early bird registration and a \$300 discount
March 15, 2013	Deadline for online registration
April 14, 2013	On-site registration opens
April 16, 2013	LNG 17 opens

- ◆ LNG Storage, Ships, Transportation and Distribution

#### Technical tours

During LNG 17, technical tours will be offered to Cheniere Energy's Sabine Pass LNG terminal in Louisiana. Originally opened as a regasification terminal in 2008, Sabine Pass is now adding liquefaction capacity to export LNG from 2015.

#### Exhibition and sponsorship

Exhibitions and Trade Fairs (ETF) will be managing LNG 17's exhibition which, with seven months still to go, is already 20% larger than the previous record set at LNG 15 in Barcelona. More than 300 exhibitors will take stands covering 18,500 square metres to showcase their products and services to the expected 5,000 delegates, plus thousands of trade visitors.

"When the global gas industry gathers in Houston for LNG 17 delegates and trade visitors can look forward to the largest and most diverse LNG showcase ever assembled," declares LNG 17 Exhibition and Sponsorship Director, Rodney Cox from ETF. "Working with our hosts, the American Gas Association, we have expanded the exhibition and sponsorship to reflect the developing nature of the LNG industry. In addition to our traditional global profile of exhibitors and sponsors the event is attracting developing sectors such as LNG as a transportation fuel and support industries including legal services. With the exhibition and conference fully integrated it is the ideal place to network and do business."

The current exhibitor list and floorplan are available at [www.lng17.org](http://www.lng17.org). Companies interested in exhibiting at LNG 17 can contact Robby Clark at ETF on [rclark@etf.com.au](mailto:rclark@etf.com.au).

The LNG 17 website [www.lng17.org](http://www.lng17.org) is the first stop for more information and you can also keep up to date with the latest news via Facebook, Google+, LinkedIn, Twitter and YouTube.

*Mark Blacklock is the Editor-in-Chief of International Systems and Communications.*





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Gas Technology Institute [www.gastechnology.org](http://www.gastechnology.org)

# Partners for the Future of Natural Gas

The American Gas Association (AGA) congratulates the Malaysian Presidency on a very successful IGU triennium and looks forward to working with the French leadership in the upcoming triennium.





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# WGC2012

This special section commemorates the 25th World Gas Conference, which was held in Kuala Lumpur, June 4-8. We start with a message from the Chair of the National Organising Committee and an overview from the editor, and then publish a summary of the reports of the Committees and Task Forces.

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# The 25th World Gas Conference – An Event to Remember

By Datuk Anuar Ahmad

▼ The 25th WGC was officially opened by the Prime Minister of Malaysia, Dato' Sri Mohd Najib bin Tun Abdul Razak.

A total of 5,299 delegates from 90 countries gathered in Kuala Lumpur from June 4-8, 2012 for the 25th World Gas Conference – the first in south-east Asia.

The event, considered by many as the most important in the gas industry, was officially opened by the Honourable Prime Minister of Malaysia, Dato' Sri Mohd Najib bin Tun Abdul Razak, on June 4, 2012. The opening ceremony

in the Plenary Hall of the Kuala Lumpur Convention Centre was given a touch of splendour with a theatrical performance portraying Malaysia's transformation from merely being the manager and regulator of a national upstream sector into one of today's global integrated oil and gas players. The grand ceremony was also enjoyed by delegates and guests at the Mandarin Oriental Hotel, the secondary venue, through holographic technology.

In welcoming delegates, exhibitors and other participants to the conference, IGU President Datuk Abdul Rahim Hashim officially unveiled IGU's new logo – a reflection of the Union's mission to advocate for natural gas as an integral part of a sustainable global energy system.

## Engaging the delegates

The main theme for this year's WGC "Gas: Sustaining Future Global Growth" inspired four sub-themes guiding daily discussions throughout the conference. Beginning with the theme "Foundation for Growth" on June 5, the week progressed to "Securing Gas Supply" on June 6, "Enhancing Gas Demand" on June 7 and "A Sustainable Future" on June 8.

A total of 67 conference sessions with topics covering every aspect of the gas value chain contributed to a comprehensive technical programme. There were 14 Keynote Addresses, four Luncheon Addresses, four Special Addresses, 10 Strategic Panels and more than 30 Technical Committee Sessions which drew on a record-breaking 712 abstract submissions. The event featured an impressive line-up of 574 speakers from the gas fraternity, who were successful in engaging audiences in dialogues about the future of the gas industry.





◀ The Prime Minister went on to open the exhibition where he is seen with the CEO of Petronas, Tan Sri Dato' Shamsul Azhar Abbas (to his left), IGU President Datuk Abdul Rahim Hashim (second left) and WGC2012 NOC Chair Datuk Anuar Ahmad (right).

### Through the exhibition halls

The exhibition was spread over 10 halls, accommodated 220 exhibitors from various parts of the world and welcomed 13,803 visitors. Exhibitors comprised of domestic and international oil and gas companies supported by the participation of local businesses from the finance and manufacturing sectors.

In the spirit of creating and enhancing relationships, a Business Networking Cocktail was held on June 5 to allow exhibitors to network with members of the gas industry, enabling both local and international companies to tap into new opportunities and benefit from shared contacts.

### Firsts for a WGC

In commemoration of the event's Silver Jubilee, a number of special features were introduced highlighting the advancement of Malaysia's technological capabilities as well as portraying its hospitality, diverse culture and heritage.

A mobile application, WGC2012 Mobile App, was introduced to enable delegates to access information about the conference and exhibition. Interactive WayFinders, located at

strategic locations, helped the delegates to find their way through the WGC2012 Village. The Interactive Expert Showcase (IES) was introduced in an effort to elevate the poster sessions to the next level. Apart from having posters on display, the IES served as a platform for poster authors to give a 10-minute presentation on their works, subsequently inviting the audience to participate in generating ideas and solutions for various topics. The Poster Library also featured interactive touch screens which

▼ After the ceremonial opening of the conference and exhibition, delegates were invited to a Welcome Gala Dinner.







▶ The comprehensive technical programme ranged from plenary key-notes (left) to committee sessions with plenty of opportunities for questions from the audience (right).

allowed delegates to browse to their liking through an extensive poster archive.

In line with Task Force 2's agenda of promoting the gas industry to future generations, the 25th WGC saw the inauguration of a Youth Programme. Activities such as the Youth Carnival and Conference, Plenary Youth Roundtable, Movie Magic Night Out, Fun with Gas Carnival and the International NRG Battle were specially designed to educate and entice 18-30 year olds into joining the gas industry.

A series of social events was also introduced starting with the WGC2012 Golf Tournament.

Held at the Kuala Lumpur Golf and Country Club, the tournament saw 106 avid golfers – from the oil and gas industry as well as WGC2012 sponsors, partners and event supporters – teeing off on June 3.

Understanding the daily exertions of participating in conference proceedings and a large exhibition, WGC2012 offered delegates opportunities to unwind by enjoying the best of Malaysian culture and visitor attractions. There was a wide selection of excursions, such as city tours around Kuala Lumpur and Putrajaya, and half-day social programmes,

▶ The first Kuala Lumpur International Music & Light Festival was held in conjunction with the 25th WGC.



such as interactive cooking classes. Additionally, a technical tour to the PETRONAS LNG Complex in Bintulu, Sarawak provided an overview of LNG operations in Malaysia.

In conjunction with WGC2012, the first Kuala Lumpur International Music & Light Festival was held at the Esplanade, KLCC. This event with the theme “World Peace, World Harmony, World Unity”, featured dancing fountains, 3D video mapping and performances by international and local artistes, and attracted approximately 20,000 spectators.



#### A special thank you

It was a big achievement for Malaysia to take over the Presidency of IGU for 2009-2012 and host WGC2012. It is an even bigger accomplishment to successfully conduct and execute the foremost event of the gas industry. I would like to take this opportunity to extend my heartfelt appreciation to all involved in realising our objective of organising a most successful and memorable World Gas Conference.

*Datuk Anuar Ahmad is the Chair of the WGC2012 National Organising Committee (NOC).*



▲▲ The 25th WGC was the first to include a Youth Programme (*below*) and the Interactive Expert Showcase was also an innovation (*beneath*).

◀ On the last day of the 25th WGC, Datuk Abdul Rahim Hashim (*right*) handed over as IGU President to Jérôme Ferrier of France.



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# The Gas World Meets in Kuala Lumpur

By Mark Blacklock

In the words of IGU's President for 2009-2012, Datuk Abdul Rahim Hashim: "The World Gas Conference is organised by the industry, with the industry and for the industry". The industry certainly turned out in force for the 25th World Gas Conference in June, where there were 5,299 participants and 220 exhibitors.

Delegates gathered in Kuala Lumpur against a more positive economic background than in 2009 when the 24th WGC was held. The host country and region are enjoying strong growth and many other regions have recovered from the global financial crisis, although there are problems in the Eurozone.

After falling in 2009 for the first time since 1997, global gas demand more than recovered in 2010 by surging 7.5%. It went on to increase 2.2% in 2011 and the positive trend is set to continue. This bright outlook was reflected in

the conference theme "Gas: Sustaining Future Global Growth".

An industry with strong growth prospects and a proud record of technological achievement is an exciting one to work in, and this was evidenced by the vibrant atmosphere in the conference rooms and exhibition halls of the Kuala Lumpur Convention Centre.

## Opening ceremony

The 25th WGC was opened by the Prime Minister of Malaysia, Dato' Sri Mohd Najib bin Tun Abdul Razak. In a first for a World Gas Conference, he combined his address with the inauguration of an important addition to the host country's gas infrastructure – an LNG receiving and regasification terminal offshore Melaka. Dato' Sri Mohd Najib inaugurated the terminal by video link with the Chief

► Datuk Anuar Ahmad, Chair of the WGC2012 NOC (*left*) with Peter Voser, CEO of Royal Dutch Shell (*centre*) and Rex Tillerson, CEO of ExxonMobil.



Minister of Melaka, Datuk Seri Mohd Ali bin Mohd Ruskam.

The opening ceremony also saw the launch of IGU's new logo and the announcement by the CEO of Petronas, Tan Sri Dato' Shamsul Azhar Abbas, that Malaysia's floating LNG (FLNG) project had got the go-ahead. Although not the first FLNG project to reach a final investment decision – that was Shell's Prelude project offshore northwestern Australia – it will be the first to enter service, in 2015.

### Sessions

Each day of the conference had a theme – Foundation for Growth, Securing Gas Supply, Enhancing Gas Demand and A Sustainable Future – which the keynote and strategic panel speakers addressed; while the results of studies that were carried out by IGU's Technical Committees during the Malaysian Presidency were shared in committee sessions, expert fora and a new type of poster session called the Interactive Expert Showcase.

There was also a youth programme for the first time in the series of World Gas Conferences, and a range of activities for around 200 young professionals and students ran concurrently with the main event. The programme culminated in the final round of the World NRG (Energy) Battle, which was won by Team Alliander for a biogas grid proposal.

### Sustainability

Although sustainability was officially the theme of the last day, this vital issue concerns all aspects of the industry's operations and was addressed throughout the conference. As Dato' Sri Mohd Najib said during the opening ceremony, "Driving sustainability has become the defining challenge of our generation".

Picking up the point during the first keynote session, Rex Tillerson, CEO of ExxonMobil, declared, "Effective standards and our industry's commitment to operational integrity, excellence and accountability are the pillars of responsible development".



◀ Christophe de Margerie, Chairman & CEO of Total.

The industry's commitment to responsible development is being put under the spotlight by the rapid growth of the unconventional gas (UCG) sector. This leapt to the top of the WGC agenda in 2009 and is central to the industry's future, but many members of the general public question its environmental impact.

"Legitimate questions require adequate answers and action," said Christophe de Margerie, Chairman & CEO of Total. "We need to improve our image and we have to be acceptable."

IGU addresses the concerns and provides answers in a special report on shale gas (see pages 172-175) which was presented during the conference; and the International Energy Agency (IEA) launched its "Golden Rules for a Golden Age of Gas" the week before. IEA Executive Director Maria van der Hoeven gave one of the WGC luncheon addresses and pointed out that while the technology for safe UCG production is tried and tested, the industry should not be complacent. "Policymakers and industry need to work together to ensure that unconventional development follows the golden rules," she said.

So far the UCG focus has been on North America and on the USA in particular, where





▶ Maria van der Hoeven, IEA Executive Director.

▶▶ George Kirkland, Chevron's Vice Chairman & Executive Vice President, Global Upstream & Gas.



new supplies have been sold in the domestic market to displace imports. This will change as other countries expand UCG production – China, for example, has massive unexploited shale gas resources – and when significant amounts of unconventional gas are exported as LNG for sale in international markets. Australia is leading the way with its coal-bed methane to LNG projects which start coming onstream in 2014; the US and Canada also have liquefaction projects.

### LNG

Indeed, the LNG sector is growing faster than the overall gas market as IGU's latest World LNG Report shows. This is partly due to the shutdown of Japan's nuclear power stations following the tragedy of March 2011, when a massive earthquake and tsunami struck the country and the Fukushima nuclear plant went into meltdown. At the time of the 25th WGC, none of Japan's 50 remaining nuclear reactors were in operation and it is gas which has

helped to fill the gap and minimise supply disruptions. (Two reactors were restarted after the conference in July.)

However, even stripping out Japan the LNG market grew 6.3% in 2011, and there was a lot for delegates to talk about. Angola is about to join the ranks of exporters, new production capacity is being developed including the first FLNG facilities and more countries are opening import terminals.

"Our growth is being led by LNG projects," said George Kirkland, Chevron's Vice Chairman & Executive Vice President, Global Upstream & Gas, who briefed delegates on Chevron's ventures in Angola and Australia.

Noting that in 2012 Shell expects to produce more gas than oil for the first time in its history, CEO Peter Voser also highlighted his company's LNG projects, including Prelude. "Our ambition is to build more FLNG vessels to tap other offshore fields that would otherwise be too costly or difficult to develop," he said.



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▶ Hamad Rashid Al Mohannadi, Managing Director of RasGas.

Hamad Rashid Al Mohannadi, Managing Director of RasGas, looked at new markets for LNG including transportation. "With regional and global environmental standards set to tighten, now is the time to support LNG-fuelled shipping," he urged.

#### NGV watershed

Speaker after speaker joined Al Mohannadi in affirming the role of gas as a transportation fuel, and the 25th WGC is likely to go down

▼ Daniel Yergin, Chairman of IHS CERA and a member of IGU's Wise Persons Group.



in IGU's history as the conference that marked a watershed in the use of natural gas vehicles (NGVs).

For years IGU and affiliated organisations such as NGV Global have been promoting the benefits of NGVs. However, while a few countries such as Argentina, Iran and Pakistan have large NGV fleets, the global fleet is small: some 15.2 million vehicles compared to over a billion running on oil products.

Now that fleet is set to grow dramatically. Gabriele Gozzi, Chairman of NGV Global, told delegates he is forecasting 53 million NGVs by 2020 and 104 million by 2030. In certain sectors gas is set to become particularly significant.

"Over the next few years, natural gas will gain market in transportation in terms of long-distance and fleets," said Daniel Yergin, Chairman of IHS CERA and a member of IGU's Wise Persons Group; while NGV Global's Gozzi declared, "LNG will become the dominant maritime transport fuel". He also pointed out that LNG-fuelled aircraft are back on the drawing board after a 20-year hiatus. The Tupolev Tu-155 test aircraft was grounded in the 1990s; now Boeing has submitted an LNG-fuelled concept to NASA as part of the Subsonic Ultra Green Aircraft Research (SUGAR) project.

Apart from the environmental considerations, price is the main factor driving a take-off into sustained growth for the NGV sector.

A barrel of oil has roughly six times the energy of a million Btu (mmBtu) of gas. While oil has traditionally traded at a premium to gas given the ease of refining it to produce a range of products, this premium is increasing. To take the US market as an example, at the time of the 24th WGC the price for West Texas Intermediate (WTI) oil of \$76/b and the Henry Hub price for gas of \$4/mmBtu meant the oil premium was about 300%. As delegates gathered for the 25th WGC, WTI was trading at around \$83/b and the Henry Hub price was just under \$2.5/mmBtu – giving an oil premium of over 500%.



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▲ Lawrence Borgard, Chairman of the American Gas Association, gives his keynote address as Jean-François Cirelli, Vice Chairman & President of GDF Suez (centre) and Zhou Jiping, President of CNPC listen.

This price disconnect was illustrated by Lawrence Borgard, Chairman of the American Gas Association, who told delegates that CNG costs 47% less than petrol on average in the USA. "Natural gas will be the foundation fuel for our energy future," he declared, highlighting transportation as a growth opportunity.

ranged from \$18/mmBtu in Japan, through \$9 in Europe to \$2.5 at the Henry Hub. This price differential is driving a number of export projects in the USA and Canada which are set to start coming onstream in 2015, and the consensus of opinion was that prices would converge although not equalise as a result of such arbitrage activities.

### Markets and pricing

As well as the oil price disconnect, delegates discussed the large variation in regional gas prices. At the time of the 25th WGC, these

IGU's Programme Committee B released its latest Wholesale Gas Price Formation study during the conference and delegates debated future pricing strategies.

► Incoming IGU President Jérôme Ferrier (left) introduces Alexander Medvedev, Deputy Chairman of Gazprom's Management Committee (centre) and Paul van Gelder, CEO of Gasunie.



Of course, outside North America long-term contracts cover a significant volume of the gas trade. "Long-term contracts are still an important instrument of sharing risks and securing long-term investment," pointed out Alexander Medvedev, Deputy Chairman of Gazprom's Management Committee.

Total's de Margerie seconded him. "Financing costly projects requires visibility on the long-term value of LNG," he said. "This is the core of the debate on price formulas."

Current formulas often include some form of oil indexing but there is growing opposition to this. "For the natural gas price to be linked to the oil price right now has lost any economic rationale," declared Mitsunori Torihara, Chairman of the Japan Gas Association, who pointed that in terms of power generation gas competes with coal and nuclear rather than oil. He would like to link to European and North American hub prices.

Torihara briefed delegates on Japan's new energy policy following the Fukushima disaster, which envisages a greater role for gas. However, he said that the high price of LNG is "a great impediment to expanding its use".

Prabhat Singh, Marketing Director of GAIL (India) agreed. If the price is right, "India could be Asia's most important LNG market," he said.

Jean-François Cirelli, Vice Chairman & President of GDF Suez, called for, "a new deal between suppliers and offtakers", while Gazprom's Medvedev suggested that price indexation be based on a renewable rather than depletable resource.

### Global vision

Pricing will also be impacted by the increasing integration of regional markets.

"The structure of the global gas market is undergoing major changes," observed Zhou Jiping, President of CNPC, who announced that his company would pursue more extensive international gas cooperation and speed up the construction of gas infrastructure to



connect resources and markets. China already has a network of LNG import terminals and an international pipeline connection with Turkmenistan which runs through Kazakhstan and Uzbekistan. More international connections and domestic trunklines are planned.

"Global gas market integration will benefit consumers, industries and producers," said Eldar Sætre, Executive Vice President of Statoil, adding, "It is essential that governments provide a secure and transparent regulatory frame-

▲ Mitsunori Torihara, Chairman of the Japan Gas Association.

▲ Prabhat Singh, Marketing Director of GAIL (India).

▼ Zhou Jiping, President of CNPC.

▼ Eldar Sætre, Executive Vice President of Statoil.





work". This point was also addressed by Paul van Gelder, CEO of Gasunie, "We need to have a well-functioning regulatory framework" and ExxonMobil's Tillerson, "regulations should provide a clear, efficient roadmap for how to get things done, not a complex tangle of rules that are used to stop things from getting done".

In order to regulate effectively, policymakers need to have a full understanding of the role of gas in current energy supply. This is the aim of IGU's advocacy programme, which was reinforced by the launch of IGU's Global Vision for Gas report during the 25th WGC. The report outlines a quantified pathway of energy use through to 2050 that is sustainable, and highlights the pivotal role of gas.

"In the US the voice of gas has become stronger," noted IHS CERA's Yergin. However, in Europe, according to Gasunie's van Gelder, "we have difficulty keeping gas on the agenda". He said that European subsidies for renewables have depressed the price of carbon and had the perverse consequence of encouraging greater use of coal in power generation.

Delegates agreed that everyone in the industry needs to work together to make sure the message about the benefits of gas gets across to all stakeholders. "IGU has a key role to play in handling this key challenge, in particular its role in promoting and advocating for natural gas," said Jean-Marie Dauger, Executive Vice President of GDF Suez.

### Handover

On the last day, the Malaysian team led by Datuk Abdul Rahim Hashim gave delegates a memorable send-off. They put on their own song and dance show before handing over to the French team led by Jérôme Ferrier. "It is a great honour for France and a privilege for me to take over the Presidency of IGU for 2012-2015," he declared.

The French Triennium will culminate in the 26th World Gas Conference in Paris in June 2015.

*Mark Blacklock is the Editor-in-Chief of International Systems & Communications Ltd.*

▼ The Malaysian team led by Datuk Abdul Rahim Hashim (centre) give delegates a memorable send-off.





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## Post-Conference Reports from the Committees and Task Forces

The 2009-2012 Triennium under the Malaysian Presidency was the shortest in the history of IGU. In the two years and eight months from October 2009 to June 2012, the Coordination Committee (CC) together with the 914 members of the 10 Technical Committees and three Task Forces put together a comprehensive technical programme for the 25th World Gas Conference. Also, for the first time in the history of the World Gas Conferences, a dedicated Youth Programme was organised by Task Force 2. This was attended by more than 250 young people from around the world and was held in parallel with the main conference.

An appreciation and farewell CC luncheon to honour all the chairs and secretaries of the Technical Committees as well as those who contributed during the Malaysian Triennium was held on June 3, 2012, at the Mandarin Oriental Hotel in Kuala Lumpur. It was also an occasion to hand over the reins to France and the next CC Chair, Georges Liens.

Ho Sook Wah, CC Chair during the 2009-2012 Triennium together with his outgoing CC Secretary, Ungku Aion Ungku Tahir, will formally present the post-conference report during the Executive Committee meeting in Ottawa in October. Here we give a summary.

▼ Ho Sook Wah (*right*) with incoming CC Chair Georges Liens at the appreciation lunch.





◀ Ho Sook Wah presents a gift to outgoing CC Secretary Ungku Ainin Ungku Tahir.

### Working Committee 1 – Exploration and Production

*Chair:* Amine Mazouzi, Sonatrach, Algeria  
*Vice Chair:* Denis Krambeck Dinelli, Petrobras, Brazil

*Secretary:* Ilhane Dib, Algerian Gas Association  
 For the 2009-2012 Malaysian Triennium, WOC 1 set up two study groups. SG 1.1 looked at advances in the exploration and production of conventional and unconventional natural gas; while SG 1.2 looked at gas projects aimed at securing a sustainable supply for global development. At the 25th WGC in Kuala Lumpur, WOC1 organised two Committee Sessions and two Expert Fora, and participated in the Interactive Expert Showcase (IES).



◀ Ho Sook Wah with Professor Coby van der Linde (centre) and Dick de Jong of the Clingendael International Energy Programme who both served on Task Force 3. Professor van der Linde is also a member of IGU's Wise Persons Group.

### Committee Session 1.1: Natural gas exploration and production

This session was a full house with 212 participants. It was chaired by Flavia Di Cino (Tenaris, Argentina) and co-chaired by Gregor Hollman (E.ON Ruhrgas, Germany).

Denis Krambeck Dinelli, who as well as being WOC 1's Vice Chair led SG 1.1, started the session by presenting the study group's triennial report entitled "Recent advances in the exploration and production of natural gas".

The report concluded that natural gas resources appear to be abundant, although the proportion qualifying as reserves depends on price, technological capabilities and accessibility. According to the International Energy Agency (IEA), the world may have twice as much natural gas as previously thought. The importance of exploration as a resource capture option for companies has slightly decreased over the last three years but remains significant. The study also highlighted that the success of frontier exploration is dependent on technological innovations and political support. Governments need to offer the necessary incentives for companies to take risks.

After the study group report, the following five papers were presented:



◀ Ho Sook Wah presents a gift to Marcel Kramer of South Stream who is IGU's Regional Coordinator for Europe and the CIS.





▶ For the 2009-2012 Triennium, WOC 1 set up two study groups. Denis Krambeck Dinelli was the leader of SG 1.1 (ABOVE LEFT) and Flavia Di Cino was the leader of SG 1.2 (ABOVE RIGHT).



- ◆ Principal approaches to developing OAO Gazprom’s long-term programme for the development of hydrocarbon fields offshore the Russian Federation, Vladimir Vovk, JSC Gazprom, Russian Federation.
- ◆ New progress of China natural gas exploration practice and new recognition of resources potential, Fudong Zhang, CNPC (Research Institute of Petroleum Exploration & Development – Langfang), China.
- ◆ High-efficiency accumulation process and exploration potential of natural gas in China, Hongjun Wang, CNPC, China.

▶ Hongjun Wang addressing WOC 1’s Committee Session 1.1



- ◆ New gas producing regions located in the Sea of Okhotsk offshore Russia, Victor Gavrilov, Gubkin Russian State University of Oil & Gas, Russian Federation.
- ◆ Technology options and economics for unconventional shale gas and gas liquids monetisation, Dennis Leppin, Gas Technology Institute, USA.

**Committee Session 1.2: Current and future exploration and production gas developments**

This session was also well attended with 234 participants. It was chaired by Denis Krambeck Dinelli and co-chaired by Vincent Trocmé (GDF Suez, France).

Flavia Di Cino, the leader of SG 1.2, began proceedings by presenting SG 1.2’s report entitled “Current and future exploration and production gas developments”.

The main objective of the study was to evaluate the prospects up to 2020 for the exploration and production of conventional gas projects and unconventional developments worldwide. It drew on the most important conclusions of WOC 1’s reports from the 2003-2006 and 2006-2009 triennia, which highlighted the cost challenges associated with increasingly tight reservoirs, complex structures and environmental concerns. Furthermore, unconventional natural gas resources are widespread and the main issue is not discovering these resources, but identifying areas where the commercial drivers enable their economic development while ensuring safe and environmentally friendly operations. Today, supply dynamics are closely coupled to demand factors, such as volumes and prices, and policy. Demand factors and policies are expected to continue driving the supply response.

Five speakers were invited to address some of the related topics and to engage in a constructive debate with the audience:

- ◆ Industrial development of Gazprom’s unique fields in East Siberia: challenges and ways to



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## Major accomplishments in gas sector in 2012

**Cameroon has proven natural gas reserves estimated at 157 billion m<sup>3</sup>, for a potential of 570 billion m<sup>3</sup>. The National Hydrocarbons Corporation (NHC) intends to execute various projects to develop this important resource beginning 2012.**

### Supply of gas to the Kribi thermal power station

The purpose of this project is produce natural gas from the Sanaga Sud offshore field and ship send it to a processing plant which will be implanted at Bipaga I near Kribi. Then, the processed gas will be carried by the NHC to the station, implanted at Mpo-longwe, by an 18 km gas pipeline. The volume of gas to be supplied to the 216 MW station is 5.8 billion m<sup>3</sup>.

### Construction of a chemical fertilizer plant

The NHC, in partnership with German company Ferrostaal AG, is carrying out feasibility studies on the construction of a chemical fertilizer plant in Cameroon. The envisaged plant aims an annual production of about 600 000 tons of ammonia and 700 000 tons of urea intended for the local export market.

### Construction of natural gas liquefaction plant

The NHC and its partner GDF Suez are carrying out studies on the production of Liquefied Natural Gas (LNG) within the framework of the Cameroon LNG project. Production will be done from a liquefaction plant whose first train could have a capacity of up to 3.5 million tons a year. The plant will be located at Mboro, 30 kilometres south of Kribi, and will be supplied by a national gas transportation network connecting it with various fields. Liquefied Petroleum Gas (LPG), or domestic gas, will also be produced by the plant.

### National Hydrocarbons Corporation

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▲ Fernando Bado (left) and Vitor De Souza presenting a certificate to Nadia Haddoum-Kherfellah who gave a presentation in WOC 1's IES session.

address them, Pavel Tsybulsky, Gazprom Vniigaz LLC, Russian Federation.

- ◆ Perspective of shale gas prospection in Poland, Marek Karabula, PGNiG, Poland.
- ◆ Current status and prospects of exploration and development of tight sands gas in China, Yujin Wan, CNPC (Research Institute of Petroleum Exploration & Development – Langfang), China.
- ◆ The potential of shale gas plays in Algeria, Mohamed Kaced, Sonatrach, Algeria.
- ◆ Unconventional gas – transforming the global gas industry, Shankari Srinivasan, IHS CERA, France.

**Expert Forum 1.A: Exploration and production challenges: finding the “Big Elephants” versus effective development**

This session was attended by an estimated 163 people. It was chaired by Nasir Darman (Petronas, Malaysia) and co-chaired by Ilhane Dib. After Nasir Darman's introduction, there were seven presentations:

- ◆ An outlook for energy and the role of natural gas, Steve Briggs, ExxonMobil Gas & Power Marketing Company, USA.
- ◆ Contribution of the exploration activity in gas reserves, Rabih Lounissi, Sonatrach, Algeria.

- ◆ Development of coal-bed methane in Russia: first results and prospects, Nikolay Storonskiy, JSC Gazprom Promgaz, Russian Federation.
- ◆ The development and management of Sulige gas field with low permeability, Chunyu Zhang, CNPC (Changqing Oilfield Company Gas Production Plant No. 4), China.
- ◆ Management best practices optimising gas sales in the Campos Basin – Brazil, Guilherme Castro, Petrobras, Brazil.
- ◆ The study and practice of unconventional gas stimulation in China, Yongping Li, CNPC (Research Institute of Petroleum Exploration & Development – Langfang), China.
- ◆ Conceptual approaches to the development of gas fields on the Russian Arctic Shelf, Rudolf Ter-Sarkisov, Gazprom Dobycha Shelf, Russian Federation.

The main conclusions were that the gas industry faces great challenges and demands a more diverse set of human, political, mechanical and technological capabilities than ever before. Competition for natural resources has driven companies to explore and produce in harsh, remote and even hostile locations, where even the simplest of logistical tasks can be difficult and costly. One of the requirements to overcome these challenges is to have a competent workforce.

**Expert Forum 1.B: De-risking and de-stranding gas resources**

This session was attended by an estimated 86 people. It was chaired by Kamel Eddine Chikhi (Sonatrach, Algeria) and co-chaired by Seung Ho Lee (Kogas, Korea). Seven panellists gave presentations on:

- ◆ Advances in unconventional gas technologies, Creties Jenkins, Degolyer & Macnaughton, USA.
- ◆ Unconventional gas monetisation: GTL, an attractive option? Jaco Schieke, Foster Wheeler, UK.
- ◆ Prospecting and exploration of hydrocarbon fields by earth remote sensing methods,

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Denis Filatov, Gazprom Vniigaz, LLC  
Russian Federation.

- ◆ Quantitative risk evaluation of strategy planning for oil and gas development, Yuping Sun, CNPC (Research Institute of Petroleum Exploration & Development – Langfang), China.
- ◆ Offshore gas-to-liquids: modular solution for associated gas with variable CO<sub>2</sub> content, Fábio Menezes Passarelli, Petrobras, Brazil.

The forum reviewed the past and prospective evolution of the concept of de-risking in exploration and appraisal, and looked at ways of exploiting stranding resources. Other related aspects, such as nano-technology, production technologies and enabling conditions for development such as gas-to-liquids co-production were also addressed. Participants concluded that the gas industry has a remarkable record of turning resources into marketable production through innovation and technological deployment.

#### *Interactive Expert Showcase*

Vitor De Souza Lima (Petrobras, Brazil) and Fernando Bado (Tenaris, Argentina), chaired WOC 1's IES session. The IES was located in Exhibition Hall 6 and each of the 13 authors had 10 minutes to present their poster with a further five minutes to take questions. The posters were also available for electronic consultation in the IES throughout the conference. The 13 papers were:

- ◆ Prediction on 3D distribution of natural gas reservoir by stochastic simulation of seismic-petroleum accumulation unit, Hongjun Zheng CNPC (Research Institute of Petroleum Exploration & Development – Northwest), China.
- ◆ Investigation of potential cases to produce substitute natural gas from low-grade coal, Katsuhiko Sasaki, The Japan Gas Association, Japan.
- ◆ Vibroseis harmonic noise cancelling by time varying filtering with reference, Mender Mourad, ENAGEO, Algeria.

- ◆ Estimation of gas and petroleum reservoir parameters using an integrated approach neural network and genetic algorithm, Iman Pishbin National Iranian Gas Company, Iran.
- ◆ Development of a 1 bpd GTL pilot plant using natural gas, Woosung Ju, Kogas, Korea.
- ◆ Optimisation of natural gas plant – gains in profitability, stability and energy efficiency, Mario Massa de Campos, Petrobras, Brazil.
- ◆ The importance of energy efficiency projects in offshore petroleum production facilities, João Luiz Maia, Petrobras, Brazil.
- ◆ New concept to develop and optimise drilling gas wells in salted areas, Nadia Haddoum-Kherfella, Sonatrach Drilling Division, Algeria.
- ◆ Productivity impairment forecast of gas wells in Latin America due to condensation, Kleber Padua, Petrobras, Brazil.
- ◆ Study on the effect of shale swelling and dispersion characteristics on shale gas fracturing, Yongqiang Fu, CNPC (Gas Production Engineering Research Institute of PetroChina Southwest Oil & Gas Field Company), China.
- ◆ Analysis of geologic features and development potential of coal-bed methane in China, Bo Wang, CNPC (Research Institute of Petroleum Exploration & Development – Langfang), China.
- ◆ Characteristics of volcanic gas reservoir and practices of development technologies in the Xushen Gas Field, Daqing, China, Tao Gao, Daqing Oilfield Company Ltd, PetroChina, China.
- ◆ The potential for natural gas exploration in the East Tarim Basin, Yuhong Lu, CNPC (Exploration, Development and Research Institute under PetroChina Tarim), China.

#### **Working Committee 2 – Underground Gas Storage**

*Chair:* Hélène Giouse, Storengy, France

*Vice Chair:* Ladislav Goryl, Nafta, Slovakia

*Secretary:* Madeleine Lafon, French Gas Association, France

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▲ Hélène Giouse and Ladislav Goryl co-chaired WOC 2's Committee Session 2.2.

For the 2009-2012 Triennium, WOC 2 set up three study groups. SG 2.1 was dedicated to the update of the underground gas storage (UGS) database previously developed by WOC 2. SG 2.2 dealt with best practices and SG 2.3 looked at the skills and competencies needed to join the UGS business. At the 25th WGC, WOC 2 organised three Committee Sessions as well as a joint Expert Forum with PGC A, and participated in the Interactive Expert Showcase.

#### ***Committee Session 2.1: UGS projects for new gas markets***

This session was chaired by Ladislav Goryl and co-chaired by Sergey Khan (JSC Gazprom, Russian Federation). It was attended by 99 people.

Ladislav Goryl began the session by presenting SG 2.1's report on trends in the underground storage business, highlighting new projects that were included when updating the database. The report also gave an overview of the number of UGS facilities in operation or projected.

The session continued with three presentations:

- ◆ UGS: a resilient business at the crossroads of gas and electricity, Jean-Marc Leroy, Gas Storage Europe, France.
- ◆ Gazprom's underground gas storages: European focus, Sergey Tregub (on behalf

of Alexander Medvedev), JSC Gazprom, Russian Federation.

- ◆ Demands & challenges of UGS construction in China for the next two decades, Guosheng Ding, CNPC (Research Institute of Petroleum Exploration & Development – Langfang), China.  
The main conclusions were:
- ◆ Gas storage facilities in Europe remain important assets to match supply and demand on a peak and seasonal basis. Increasingly, the gas storage business will also respond to new market requirements linked to the development of competition (such as short-term arbitrage) and environmental goals (where gas is needed to back up renewable power generation).
- ◆ The development of storage sites in Europe is a strategic tool to guarantee stability and flexibility in the supply of Russian gas.
- ◆ There is an urgent need for gas storages in China. However, technical challenges such as complex geological conditions should first be addressed.

#### ***Committee Session 2.2: Optimising UGS activities: challenges for operators and clients***

This session was chaired by Hélène Giouse and co-chaired by Ladislav Goryl.

Ladislav Goryl began by presenting the trends identified from the update of the UGS database, which covers 567 facilities. The session continued with four presentations:

- ◆ The shale gas revolution and gas storage in North America, Julie Dill, Spectra Energy, USA.
- ◆ Debottlenecking of UGS Lab 3, synergy effects of interconnected storages UGS Lab 3 and Reservoir Gajary-Baden, Tomáš Ferencz, Nafta, Slovakia.
- ◆ Simulation and practice of the gas storage in low quality gas reservoir, Jerzy Stopa, AGH University of Science & Technology, Polish Oil & Gas Company, Poland.

- ◆ Better water production forecasts for enhanced performances, Patrick Egermann, Storengy, France.  
The main conclusions were:
- ◆ Thanks to the shale gas revolution, gas has become a very competitive fuel in the US. More gas-fired power stations are being developed and UGS supports these new plants. Emerging demand due to the shale gas revolution may also provide new opportunities for storage. Currently the storage industry has to manage very high gas levels in reservoirs.
- ◆ Tomáš Ferencz explained the various steps involved in debottlenecking the withdrawal part of Lab 3, the biggest storage site in Slovakia, in order to increase capacity to meet market demand.
- ◆ Jerzy Stopa introduced investigations that show the impact of gas mixing on UGS performance and demonstrated how this phenomenon can be controlled by using computer simulation.
- ◆ The evolution of the European market has led to increasing short-term flexibility requirements. As regards aquifer storage facilities, the new operational conditions necessitate improvements in the pressure and water history matching of numerical models used for storage performance evaluation and daily withdrawal follow-up. These are crucial to increase performance and reduce water production.

### **Committee Session 2.3: Competencies and innovative technologies for efficient UGS**

This session was chaired by Vladimir Onderka (RWE Gas Storage, Czech Republic) and co-chaired by Hélène Giouse.

Vladimir Onderka presented the findings of the questionnaires WOC 2 sent out during the 2009-2012 Triennium to seek information on the required competencies for UGS activities. The findings highlighted a shortage of geoscientists in the coming years.



Jana Kyplova (Czech Gas Association) gave an overview of the Young Employees Exchange Programme which brought together 15 young professionals from China, Europe and Russia for training on storage activities during the summer of 2011.

Hélène Giouse presented SG 2.2's report on best practices in reducing methane emissions and well integrity management for ageing UGS facilities. Methane emissions are reducing thanks to major efforts on this front. The report also outlined the steps in developing a well integrity management system with the aid of a flow chart.

The session continued with four presentations:

- ◆ Educational system in the field of UGS, Nikita E. Barsuk, JSC Gazprom, Russian Federation.
- ◆ Application of advanced technologies for evaluation of underground natural gas storage wells' integrity and operational safety at the Latvijas Gaze facilities, Sergey Vlasov, Gazpromenergodagnostika LLC, Russian Federation.
- ◆ Obstruction in a salt cavern: solution is dissolution, Ivan Charnavel, Storengy Deutschland GmbH, Germany.
- ◆ Isotopic techniques to monitor gas releases at Diadema UGS – Argentina, Juan Rodríguez, YPF S.A., Argentina.

The main conclusions were:

▲ Juan Rodríguez addressing WOC 2's Committee Session 2.3.



- ◆ UGS staff need specialised knowledge and skills in addition to having standard geological and engineering capabilities. In Russia, specific curricula dedicated to UGS competencies have been developed to meet this need.
- ◆ Sergey Vlasov confirmed that well integrity management is a key issue for storage facilities. Operations at Inchukalnskoe have provided good results, thanks to the specific techniques which allowed analyses without killing any well.
- ◆ Technical challenges also allow creativity. For example, the leaching of a cavern at Peckensen storage in Germany was made possible thanks to the use of innovative techniques specifically developed for this project and close cooperation between mining engineers and well specialists.
- ◆ An efficient methodology is a key asset for monitoring storage facilities in safe conditions (e.g. Diadema – Argentina).
- ◆ Application of 3D seismic exploration technique in evaluating and optimising favourable areas for salt cavern gas storages, Yusheng Zhang, CNPC (BGP), China.
- ◆ Modelling hydrogeochemical processes in the UGS reservoir under the project of partial replacement of cushion gas for CO<sub>2</sub>, Georgy Ruban & Sergey Khan, Gazprom Vniigaz LLC, Russian Federation.
- ◆ Using gas storage to manage the production of natural gas, Jerzy Stopa & Piotr Kosowski, AGH University of Science and Technology, Poland.
- ◆ Lessons learned from the optimisation of the Suchohrad-Gajary storage object, Stanislav Bilik, Nafta, Slovakia.
- ◆ Technology and modelling serving customer satisfaction: developing a flexible offer in UGS, H el ene Giouse, Storengy, France.
- ◆ Role of UGS facilities of Ukraine to ensure reliable and efficient gas consumption, Andrii Datsyuk & Petro Galii, Ukrtransgas AC, Ukraine.
- ◆ New technologies and UGS development in Russia, Oleg Aksyutin, Gazprom, Russian Federation.
- ◆ Changing the game – case study of state-of-the-art exploration of an aquifer storage site in Germany and impact of high-resolution data on the initial development plan based on vintage data, Martin Z uhlke & Volkmar Neumann, Gazprom Germania GmbH, Markus St ower, UGS GmbH, Germany.

***Expert Forum 2.A/6.B: CO<sub>2</sub> capture, transport and sequestration: technologies involved and project developments to increase gas industry sustainability***

This expert forum was jointly organised by WOC 2 and PGC A and is covered in PGC A's report on page 118.

***Interactive Expert Showcase***

Ten posters were selected for presentation during WOC 2's IES session, which was chaired by Vladimir Onderka and co-chaired by Madeleine Lafon. Each presentation was allocated 15 minutes inclusive of Q&As, and the session was well attended with standing room only. The posters were:

- ◆ Gaseous helium storage in salt caverns: influence of physical properties, Sergey A. Khan, JSC Gazprom, Russian Federation.
- ◆ Evaluation of feeding Istanbul's European-side natural gas distribution network from TPAO's Silivri UGS facilities during peak demands, Fatih Unluuysal, IGDAS, Turkey.

**Working Committee 3 – Transmission**

*Chair:* Eric Dam, N.V. Nederlandse Gasunie and Energy Delta Institute, The Netherlands

*Vice Chair:* Benjam n Guzm n, Transportadora de Gas del Sur S.A., Argentina

*Secretary:* Rein Bolt, N.V. Nederlandse Gasunie, The Netherlands

During the 2009-2012 Triennium, WOC 3 was organised into three study groups:

- ◆ SG 3.1: Strategic gas transmission infrastructure projects, led by Enno Freese, N.V. Nederlandse Gasunie, The Netherlands.

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- ◆ SG 3.2: Integrity of gas transmission systems and footprint reduction, led by Mohd Nazmi bin Mohd Ali Napiah, Petronas, Malaysia.
- ◆ SG 3.3: Securing sufficient expertise to operate gas transmission systems safely and adequately, led by Barbara Jinks, GHD, Australia.

WOC 3 had 93 active members and seven corresponding members and held six meetings in Amsterdam, The Netherlands; Houston, USA; Rio de Janeiro, Brazil; Catania, Italy; Brisbane, Australia; and Moscow, Russia. There was good attendance at almost every meeting with an average of 30-35 participants.

At the 25th WGC, WOC 3 was responsible for the organisation and content of three Committee Sessions, two Expert Fora and three Interactive Expert Showcase sessions. All topics and deliverables mentioned in 2009-2012 Triennial Work Programme were covered. An important element in organising the WGC sessions was the use of the call for papers. In total, WOC 3 received 112 abstracts from 25 different countries.

### ***Committee Session 3.1: Strategic gas transmission infrastructure projects***

This session was chaired by Eric Dam and was attended by 107 people. Eric Dam gave a brief summary of the WOC 3 organisation and introduced the six speakers. Two SG 3.1 members, Enno Freese and Ansgar Brauer (E.ON Ruhrgas, Germany), gave a presentation on the work of SG 3.1 over the last three years and its final report, while four interesting papers were presented on major gas transmission infrastructure projects. The four papers presented were:

- ◆ South Stream offshore pipeline project, Marcel Kramer, Royal Dutch Gas Association – KVG, South Stream Transport AG, Switzerland.
- ◆ Experience of designing natural gas transmission pipelines in super challenging conditions of Eastern Siberia & the Far East, Svetlana Dzyuba, JSC Gazprom, Russian Federation.
- ◆ Design of the latest Gasunie compressor stations in a cross-border environment is a challenging business, Adrian Pijnacker Hordijk, NV Nederlandse Gasunie, The Netherlands.
- ◆ Protecting the Baltic Sea's environment – Nord Stream's exemplary environmental & social management during permitting & construction, Werner Zirinig, Nord Stream AG, Switzerland.

### ***Committee Session 3.2: Integrity of gas transmission systems and environmental footprint reduction***

This session was chaired by Benjamín Guzmán and was attended by 93 people. For many years, integrity has been a very popular topic during World Gas Conferences. Many abstracts were submitted for an oral presentation and only seven papers were selected. Mohd Nazmi bin Mohd Ali Napiah began by presenting SG 3.2's report, and four other papers were presented. A lively Q&A session ensued after the high quality presentations as participants engaged in active discussion.

▶ WOC 3's Chair, Eric Dam addressing Committee Session 3.1.





The following papers were presented:

- ◆ Analysis & assessment of natural risks for unified gas supply system facilities of Russia using promising geoinformation technologies, Lada Vlasova, Galina Rakitina & Sergey Dolgov, Gazprom Vniigaz LLC, Russian Federation.
- ◆ Managing integrity of high pressure gas pipeline: root cause analysis & hydrogen induced crack (HIC) direct assessment of weldment crack on 30" gas pipeline, Mohd Nazmi Mohd Ali Napiah & Shaidi Ahmad, Petronas, Malaysia.
- ◆ Safety in European gas transmission pipelines, Dick Brand van Den, The Netherlands.
- ◆ Managing fugitive emissions of gas transport: economically feasible whilst reducing the environmental impact, Menno Bekker, N.V. Nederlandse Gasunie, The Netherlands.

### ***Committee Session 3.3: Securing sufficient expertise to operate gas transmission systems safely and adequately***

This session was chaired by Barbara Jinks and was attended by 101 people. It ran in two parts: a series of presentations and then a panel discussion.

Barbara Jinks started by giving an overview of SG 3.3's work and the main findings of its research, following which there were four presentations:

- ◆ Developing technical capability of Petronas pipeline engineers, Raja Zahiruddin bin Raja Ismail, Petronas Carigali Sdn Bhd, Malaysia.
- ◆ TGS organisational model for retaining talent, Carlos Seijo, Transportadora de Gas del Sur S.A., Argentina.
- ◆ Competency matrices: the tool to securing sufficient expertise to operate gas transmission systems safely and adequately, Janet van Dellen, N.V. Nederlandse Gasunie, The Netherlands.
- ◆ A training model to operate gas transmission systems safely, Vladimir Potocny, Eustream, Slovakia.

In the second part of the session there were five panellists, representing the fields of edu-



cation, training, an industry association, operations and human resources:

- ◆ Eric Dam;
- ◆ Samsudin Miskon, Petronas Gas Bhd, Malaysia;
- ◆ Cheryl Cartwright, Australian Pipeline Industry Association, Australia;
- ◆ Carlos Seijo, Transportadora de Gas del Sur S.A, Argentina; and
- ◆ Shairose Madhani, Chevron, USA.

After the panellists' presentations, there was lively discussion with many questions and recommendations from the audience.

### ***Expert Forum 3.A: Construction of pipelines in extreme conditions – challenges and solutions***

This session was chaired by Enno Freese and was attended by 147 people. All papers were related to large cross-border pipeline projects and the presenters gave an excellent overview of the challenges and lessons learned. Nicola Batillana (Snam Rete Gas, Italy) presented the results of SG 3.1's study into the state of the art of horizontal directional drilling and micro tunnelling. There were five other papers as follows:

- ◆ Project challenges with the Nord Stream project, Henning Kothe, Nord Stream AG, Switzerland.

▲ Vladimir Potocny, Janet van Dellen and Carlos Seijo during WOC 3's Committee Session 3.3.

▶ Daniel Falabella addressing WOC 3's Expert Forum 3.B. Also on the top table are Fokke Abel de Jong, Georgy Fokin and session chair, Mohd Nazmi bin Mohd Ali Napiah.



- ◆ Field experience with a novel pipe protection monitoring system for large offshore pipeline construction projects, Michael Magerstaedt, Rosen Swiss AG, Switzerland.
- ◆ Medgaz: the new direct gas link between Algeria & Europe via Spain, Juan A. Vera, Medgaz S.A., Spain.
- ◆ The Urucu-Manaus project, Juarez Mattos, Petrobras, Brazil.
- ◆ Impact of Nord Stream on parallel gas transmission infrastructure in Slovakia, Peter Toth.
- ◆ The upgrade of Snam Rete Gas telecontrol systems, Nicola Battilana, Snam Rete Gas S.p.A., Italy.
- ◆ Combined application of in-line inspection magnetic technologies for detection of stress corrosion cracks in Gazprom's Yambourg-Elets-1 gas pipeline, Sergey Popov, Spetsneftegas NPO JCS, Russian Federation.

#### **Interactive Expert Showcase**

WOC 3's IES session was attended by 211 people and featured 16 posters on the committee's three different topics:

#### **Expert Forum 3.B: Pipeline integrity and the human challenge**

This session was chaired by Mohd Nazmi bin Mohd Ali Napiah and was attended by 93 people. Five papers covering many different aspects of pipeline integrity were presented followed by a lively discussion with the audience during the Q&A session. The five papers presented were:

- ◆ New approach to increasing the energy efficiency of a large-scale gas transportation system, Georgy Fokin, Gazprom, Russian Federation.
- ◆ Pipeline damage protection, Fokke Abel de Jong, N.V. Nederlandse Gasunie, The Netherlands.
- ◆ SCC a problem in the industry & one way to manage it, Daniel Falabella, TGS, Argentina.

- ◆ IES 3.1: Integrity of gas transmission systems, chaired by Daniel Hec, Marcogaz, Belgium.
- ◆ IES 3.2: Environmental footprint reduction measures, chaired by Pål Rasmussen, Gassco, Norway.
- ◆ IES 3.3: Strategic gas transmission infrastructure projects, chaired by Ansgar Brauer.

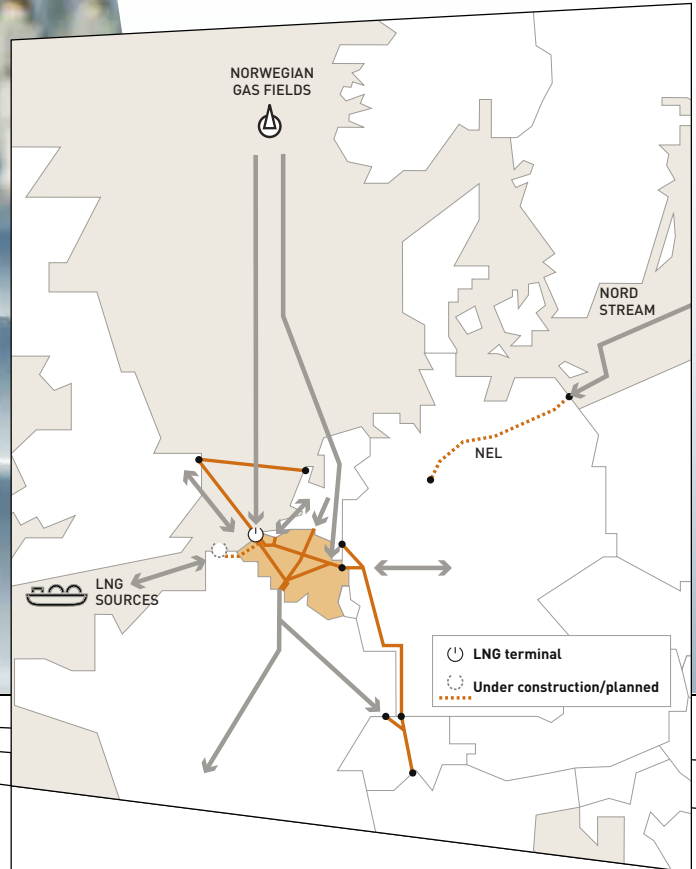
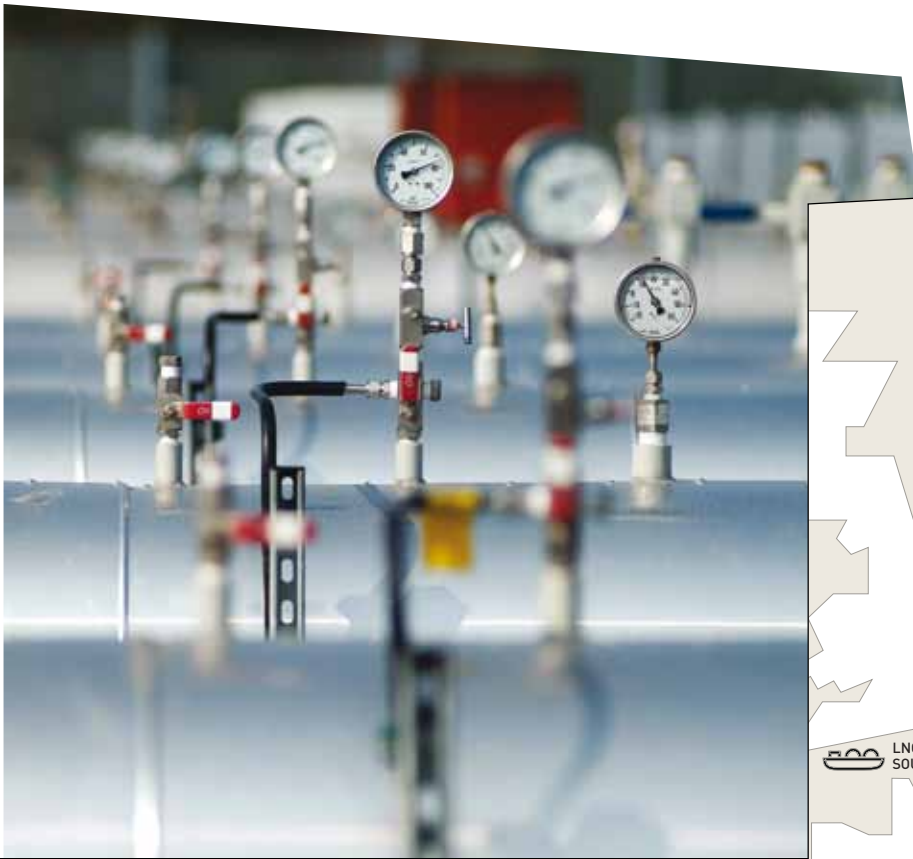
#### **Working Committee 4 – Distribution**

**Chair:** Alessandro Soresina, A2A S.p.A., Italy

**Vice Chair:** Dietmar Spohn, Stadtwerke Bochum, Germany

**Secretary:** Mario Pelizzoli, A2A S.p.A., Italy

During the 2009-2012 Triennium, WOC4 performed an in-depth analysis of three subjects of great relevance for distribution activities as well as the whole gas chain.



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These subjects were: safety management systems, smart metering systems and unaccounted-for gas (UFG). At the 25th WGC, WOC 4 organised three Committee Sessions and two Expert Fora and participated in the Interactive Expert Showcase. A member of WOC 4, on behalf of the Chair, also participated as a panel speaker in the first WGC Youth Programme.

#### **Committee Session 4.1: Gas distribution safety management systems**

This session was attended by 123 people and was chaired by Ben Lambregts (Liander, The Netherlands). As the leader of WOC 4's Study Group 4.1, he also presented the report on safety management systems. In addition, the following four papers were presented on this subject:

- ◆ Development of safety management processes: feedback, analysis of human & organisational factors and creation of a simulator to enhance collective competencies in operational activities, Jean-Yves Pollard, GrDF, France.
- ◆ Investing in the future – long-term optimisation of asset replacement in the collective

regional gas grids of The Netherlands, Gido Brouns, Enexis, The Netherlands.

- ◆ Legal & methodological basis of gas distribution systems' operating reliability, Svetlana Skortsova on behalf of Yuriy Yarygin, JSC Gazprom Promgaz, Russian Federation.
- ◆ The UK mains replacement methodology & its role in reducing leakage repairs, Rosemary Mcall, GL Noble Denton, UK.

The four papers gave an in-depth analysis of some of the most relevant factors that influence safety and its management in gas distribution.

#### **Committee Session 4.2: Smart metering systems**

This session was attended by 134 people and featured an audience response system to enhance interactivity. It was chaired by Kim Vrancken (Eandis, Belgium), the leader of Study Group 4.2, who presented the report entitled "Smart metering systems: characteristics, technologies, costs". Four additional papers were presented during this session:

- ◆ Introducing (gas) smart meters in Europe: the challenge of standards, Daniel Hec, Marcogaz, Belgium. This presentation gave the audience an understandable and clear

▶ Daniel Hec addressing WOC 4's Committee Session 4.2.



overview of the standardisation process in Europe.

- ◆ Approach for the implementation of AMR system for gas meters in France, Isabelle Drochon & Pascal Vercamer, GrDF, France. This presentation gave the audience a great example of a smart gas metering project in Europe. The project was one of the three winners of IGU's Best Practices Award.
- ◆ Developing advanced metering (the ubiquitous metering system), Kenichiro Yuasa, Tokyo Gas & Yasuhiro Fujii, Osaka Gas, Japan. This interesting presentation gave an overview of Japan's long experience with smart gas metering.
- ◆ The policies for the large-scale deployment of smart gas meters in some European countries & drawing policy implications, in particular for Italy, Stefano Cagnoli, Iren Emilia S.p.A., Italy. This presentation gave the audience an overview of the situation as regards smart gas metering systems in Italy.

#### ***Committee Session 4.3: Unaccounted-for gas: identification, measurement, calculation and management***

This session was attended by 103 delegates and was chaired by Barbara Jinks (GHD, Australia), the leader of Study Group 4.3, who presented the report on UFG. In addition, the following four papers were presented:

- ◆ Impact of meter reading cycles & consumption allocation procedures on UFG, José Francisco Quinta Catela Pequeno, Galp Energia S.A., Portugal. This presentation gave the audience an in-depth analysis of the effects of standard activities on UFG.
- ◆ Management of fugitive emissions at above-ground natural gas transmission, storage & distribution facilities, Lloyd Chiotti, Enbridge Gas Distribution, Canada. This presentation, together with the following paper focused on fugitive emissions, one of the components of UFG.



◆ WOC 4's Committee Session 4.3 was chaired by Barbara Jinks.

- ◆ Fugitive emissions at gas distribution networks: mitigation options, Natalya Kruglova, Gazprom Vniigaz LLC, Russian Federation.
- ◆ Theft mitigation in the automotive market, José Carlos Broisler Oliver, Comgás, Brazil. This presentation was an eye-opener for the audience as it highlighted a component of UFG that can be one of the most relevant but is often not considered.

#### ***Expert Forum 4.A: Safety management, smart metering and unaccounted-for gas: a technical perspective***

The session was chaired by Dietmar Spohn and was attended by 95 delegates. A selected group of speakers gave presentations on technical approaches to the three WOC 4 topics of the 2009-2012 Triennium. The seven papers presented were:

- ◆ Emergency services & technology development to respond to gas leaks on customers' premises, Hajime Kojima & Sosuke Yahata, Tokyo Gas, Japan.
- ◆ Research on next-generation technologies for improving the safety of gas pipelines, Yuji Higuchi, Osaka Gas, Japan.



▲ WOC 4's Expert Forum 4.B was chaired by Ben Lambregts (*right*) seen here with Aziz Belkhatir and Paula Cristina Andrade.

- ◆ SeCuRi® SAT – network survey without a guide, Lutz Hoernschemeyer, Hermann Sewerin GmbH, Germany.
- ◆ Smart gas meters & middleware for energy efficient embedded services, Marco Piovano, Italgas, Italy.
- ◆ Remote reading of smart gas metering Project in Iran, Behzad Babazadeh, National Iranian Gas Company, Iran.
- ◆ Analysis of the metrological performance of diaphragm gas meters in a city distribution network, Paulo Del Gaudio, Genova Reti Gas, Italy.
- ◆ Effects of the calibration of gas metering reliability & impressive results after calibration, Cevat Ozarpa, Istanbul Gas Distribution Company & Trade Inc., Turkey.

**Expert Forum 4.B: Safety management, smart metering and unaccounted-for gas: a management perspective**

This session was chaired by Ben Lambregts and was attended by 91 people. A selected group of speakers gave presentations on management approaches to the WOC 4 topics. The five papers presented were:

- ◆ Secure gas transportation and distribution in urban areas – safety system of gas network & urban planning, Aziz Belkhatir, IFREI (Paris) and RITE (Université Oran), France.
- ◆ Health, safety & environmental management in natural gas distribution, Paula Cristina Andrade, Petrobras, Brazil.
- ◆ The effect of professional training management on organisational performance of a natural gas distribution company & the concept of intellectual capital, Faruk Surer, IGDAS, Turkey.
- ◆ Misreading of conventional diaphragm domestic gas meter, René Hermkens, Kiwa Gas Technology, The Netherlands.
- ◆ Managing unaccounted-for gas in the distribution network; the Gas Malaysia experience, Awangku Faizulemari bin Awang Tajudin, Gas Malaysia Bhd, Malaysia.

**Interactive Expert Showcase**

WOC 4's contribution to the IES was organised in two parallel sub-sessions chaired by Jeremy Bending (National Grid, UK) and José Carlos Broisler Oliver. A total of 104 people attended and there were 14 posters. Each of the authors had a 15-minute slot to present their work and take questions.

Held for the first time, the IES which replaced the poster session was very popular and worked well. The use of headphones for participants was particularly effective in overcoming the background noise from the many people visiting the poster area.

**Youth Programme – Panel Session**

Stefano Cagnoli, on behalf of WOC 4 Chair, Alessandro Soresina, participated in the first WGC Youth Programme. He gave a presentation entitled "Gas distribution: is there a role in building better communities in a liberalised market?" during the Panel Session on the issue of "The role of gas in building better communities". The session provided an opportunity to interact with young people approaching





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\*Good day

## Natural Gas - Growth for Greece

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DEPA works for the further expansion of natural gas grid in Greece so that each day more people all around the country welcome a better world with a warm kalimera!





► Mohd Fairos Roslan addressing WOC 5's Committee Session 5.1.

our industry for the first time, and facilitated a very good exchange of opinions with the audience.

#### **Working Committee 5 – Utilisation**

*Chair:* Tatsuo Kume, Osaka Gas, Japan  
*Vice Chair:* Eugene Pronin, JSC Gazprom, Russian Federation

*Secretary:* Ichiro Baba, Osaka Gas, Japan  
 WOC 5's three study groups for the 2009-2012 Triennium covered different gas utilisation sectors: industrial, commercial & domestic and natural gas vehicles (NGVs). At the 25th WGC, WOC5 organised three Committee Sessions and two Expert Fora and participated in the Interactive Expert Showcase.

#### **Committee Session 5.1: Industrial utilisation: technologies for efficiently stimulating gas demand**

This session was chaired by Nuno Afonso Moreira (Duorogás, Portugal) and co-chaired by Egidio Adamo (Eni Gas & Power Division, Italy). It was attended by 114 people.

The session started with opening remarks from Nuno Afonso Moreira, who explained the method and contents of SG 5.1's report. This was followed by the presentation of the report's main topics: market situation by Alekey Zorya (Gazprom, Russia); rational use of energy by Egidio Adamo; combined heat and power (CHP) by Mohd Fairos Roslan (Petronas, Malaysia); and renewables by Philippe Buchet (GDF Suez, France). Then, four more speakers gave examples of how technological developments can stimulate gas demand:

- ◆ Description of ways to use known technology in a new way for CHP, Ramanan Suryanarayan for James DiCampi, GE Energy, USA.
- ◆ Energy saving technology and development of new regenerative burners, Masaya Kondo, Osaka Gas, Japan.
- ◆ Fuel switching to a gas-fired system for textile stamping to obtain the same product quality with less energy, Ivan Rocha, SC Gas, Brazil.
- ◆ Biogas-fired dual-fuel engines, Masahide Tsujishita, Osaka Gas, Japan.

The main conclusion was that continued research into ways to improve energy efficiency combined with economic and environmental sustainability will support successful gas developments.

#### **Committee Session 5.2: Domestic and commercial utilisation: gas innovation roadmap for the new sustainable market demand**

This session was chaired by Martin Seifert (Swiss Gas & Water Association, Switzerland) and co-chaired by Frédéric Pastier (GDF Suez, France). It was attended by 98 people and was divided into three parts with a total of 11 presentations.

Part 1 had four speakers, Henk Ensing (Gasterra, The Netherlands), Jérôme Maldonado (Uniclimate, France), Frédéric Aguilé (GDF Suez, France) and Martin Wilmsmann (E.ON Ruhrgas,

Germany), who explained the most effective ways to introduce new gas technologies to markets.

Part 2 looked at the development of different technologies. There were presentations on: low power modulating boilers and hybrid heat pumps (or hybrid boilers) by Frédéric Pastier; on gas heat pumps by Gianmarco Peretti, (Regas, Italy); on residential proton exchange membrane (PEM) fuel cells by Kunihiro Nishizaki (Tokyo Gas, Japan), on micro-CHP and the added value of secure power production by Hiroaki Ishida (Osaka Gas, Japan); and on a residential solid oxide fuel cell (SOFC) CHP system by Katsuki Higaki, (Osaka Gas, Japan). All these presentations showed that new gas technologies are efficient and sustainable, and that innovation is the main driver of success.

Part 3 looked at the potential to create new businesses with presentations from Andrew Staniford (Envestra, Australia) on the opportunities offered by fuel cell technology for natural gas networks and from Egidio Adamo on energy services.

The main conclusions were:

- ◆ Energy suppliers have to share their tech-

nological roadmaps, broaden their work scopes to the tertiary market and develop smart energy grids.

- ◆ Innovation is the main driver of success, but the road is long and energy suppliers and manufacturers need to work together.
- ◆ New business models must be developed and smart grid innovations have to be integrated at an early stage.

### ***Committee Session 5.3: NGVs: the solution for a low-carbon society***

This session was chaired by Eugene Pronin and co-chaired by Davor Matic (OMV Hrvatska, Croatia). It was attended by 153 people and was divided into two main parts.

In Part 1, Eugene Pronin and Davor Matic presented the main conclusions of Study Group 5.3's report, which highlights dramatic growth in the NGV sector and forecasts that the world NGV fleet will reach 60 million vehicles by 2020. The report was prepared jointly by IGU and the UN Economic Commission for Europe and involved contributions from 88 experts from 65 companies in 30 countries along with inputs from several associations.

▼ There was a line-up of eight speakers (chaired by Eugene Pronin, *far right*) for WOC 5's Committee Session 5.3 on NGVs.







▲ A packed house for WOC 5's Committee Session 5.3 on NGVs.

In Part 2, six experts shared information regarding good practices, business development, technological development and safety. Jonathan Burke (Westport Innovations, Canada) explained that main drivers for the use of natural gas for heavy duty applications were energy security of supply, environmental benefits, economics and the regulatory framework.

Then, Keyvan Sharifi (Petro Taam Tech & Iran Gas Khodro, Iran) gave an overview of Iran's NGV sector, highlighting its strong growth while drawing attention to certain safety issues. Regarding safety, Olivier Bordelanne (GDF Suez, France) presented the results of a comparative study on the risks of CNG and diesel buses and heavy duty vehicles in tunnels. Based on several scenarios, this study shows that CNG vehicles, when complying with current safety regulations, are up to three times less dangerous than the corresponding diesel vehicles.

Technological innovations were addressed by Walter Lange (Gasmobil AG, Switzerland) and Naoko Fukutome (Tokyo Gas, Japan), who gave separate presentations on the potential offered by CNG hybrid vehicles, and by Antonio Nicotra (AIR-LNG S.A., Luxembourg), who gave a presentation on the use of LNG as an aviation fuel.

The session participants concluded that the use of gas as a transportation fuel represents a

growing opportunity and is likely to be a hot topic in the new triennium.

***Expert Forum 5.A: How to integrate renewable power in the natural gas grid – or how to convert fluctuating wind power and biomass/biogas to biomethane – or “green” natural gas?***

This session was chaired by Aksel Hauge Pedersen (DONG Energy, Denmark) and was attended by 92 people.

The session began with an introduction by Aksel Hauge Pedersen on the role of the natural gas grid in supporting renewable energy. Then there were presentations on the three major production possibilities for “green natural gas”:

- ◆ Power to gas, Mogens Mogensen, DTU/Risoe, Denmark.
- ◆ Green gas from the gasification of biomass, Philippe Bouchet.
- ◆ Upgrading of biogas (made through fermentation), Tatsuo Kume and Shojiro Osumi, Osaka Gas, Japan.

The presentations were followed by a panel discussion involving all speakers together with Vladislav Karasevich (Gazprom, Russia), Mohd Fairos Roslan and Nuno Afonso Moreira. The main topics for the discussion were whether green natural gas would – or should – be able fully to substitute for fossil natural gas and over what time scale; where it will be introduced first; and the necessary political conditions for green natural gas to substitute for fossil natural gas.

The conclusions from the discussion did not give clear answers to these questions. It was noted that some countries (such as Denmark, Germany and The Netherlands) are giving high priority to the development of green gas technologies; and that some of these technologies (such as the solid oxide electrolyser cell, SOEC, for power to gas) will be very cost-effective in the future. However, participants agreed that for many years green gas will be more expensive than fossil gas. The chairman concluded



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▶ Jean Schweitzer chaired WOC 5's Expert Forum 5.B.

that the reason was too little concern about climate change and that if fossil fuels were subject to a CO<sub>2</sub> tax then renewable gas would be competitive.

#### ***Expert Forum 5.B: Gas quality changes, impact and remedies***

This session was chaired by Jean Schweitzer (DGC, Denmark) and co-chaired by Daniel Hec (Marcogaz, Belgium). It was attended by 170 people and was divided into four parts.

Part 1 dealt with the impact of gas quality on utilisation. There were presentations on the situations in the EU (Jean Schweitzer), Japan (Tatsuo Kume) and China (Qi Wang, China Gas Society), which highlighted a number of similarities. The expansion of the LNG business means that there is a global diversification of sources, while proposals to inject hydrogen into natural gas grids may impact the market. Petra Nitschke-Kowsky (E.ON Ruhrgas) said that a blending rate of up to 10% H<sub>2</sub> in the natural gas supply would be a realistic figure

according to investigations carried out on central heating boilers.

There are different approaches to the issue of gas quality. In the EU, the industry typically accepts variations in a range which appliances are able to cope with. In Japan, the approach is to ensure natural gas is supplied at a constant quality.

Part 2 of the session was dedicated to solutions to variations in gas quality, and examples of technologies that could be used in the EU and Japanese situations were presented. Martin Kiefer (Karlsruhe Institute of Technology, Germany) demonstrated that a relatively cheap combustion control can be used on boilers. Naoya Iwata (Toho Gas, Japan) presented a new plant to adjust the calorific value of LNG supplies.

Part 3 looked at the gas quality range in practice. François Cagnon (GDF Suez, France) gave a presentation on what is currently happening in Europe, where the European Commission has initiated actions to harmonise gas quality. There is a pilot project involving Belgium, Denmark, France, Germany and Spain.

Part 4 was a roundtable chaired by Daniel Hec with enthusiastic audience participation.

The gas quality discussion will need to be continued within IGU. There are many initiatives on different fronts and in different countries. Gas quality is already a topic in the work programme of several committees in the next triennium.

#### ***Interactive Expert Showcase***

WOC 5's contribution to the IES was organised in two parallel sub-sessions chaired by Egidio Adamo (deputy leader of SG 5.1) and Frédéric Pastier (deputy leader of SG 5.2). There were 14 posters: one related to each of the topics of renewable energy, gas quality and smart grids; three posters related to energy efficiency; five posters related to combined heat and power (CHP); and three posters related to NGVs.





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### Programme Committee A – Sustainability

*Chair:* Juan Puertas, Gas Natural Fenosa, Spain

*Vice Chair:* Satoshi Yoshida, Tokyo Gas Co Ltd, Japan

*Secretary:* Naiara Ortiz de Mendibil, Spanish Gas Association (Sedigas), Spain

For the 2009-2012 Triennium, PGC A was organised into three study groups to address topics on natural gas sustainability, providing constructive solutions for the energy future which are of particular interest to IGU and PGC A members. At the 25th WGC, PGC A organised a Strategic Panel, two Committee Sessions and two Expert Fora, and participated in the Interactive Expert Showcase. Juan Puertas also participated in the first WGC Youth Programme.

#### *Strategic Panel 9: Gas and renewables partnership*

This Strategic Panel was attended by 421 people and was moderated by Klaus Schäfer, the CEO of E.ON Ruhrgas AG and E.ON Energy Trading SE. The panellists were: Dr Mauricio Bermudez Neubauer (Clean Energy Solutions,

Accenture); Marco Arcelli (Executive Vice President, Upstream Gas Division, ENEL); Gertjan Lankhorst (CEO, GasTerra BV, The Netherlands); and Christian Kjaer (CEO, European Wind Energy Association).

Four videos were shown covering solar energy, renewable gases (biogas and biomethane), wind energy and energy efficiency. The video session was followed by a roundtable discussion among the four panellists who highlighted that natural gas as the cleanest burning fossil fuel remains an essential part of the energy mix, and that renewable energies are needed to reduce CO<sub>2</sub> emissions despite their high cost and intermittent nature.

In the Q&A session, a delegate raised the point that the views provided by the speakers on the coexistence of renewable energy and natural gas were basically focused on situations in Europe and Asia, but that in the American continent the situation was very different.

#### *Committee Session 6.1: Integrating renewable gases into the natural gas industry*

This session was attended by 82 people and was chaired by Elbert Huijzer (Alliander, The Netherlands), the leader of Study Group A. 2, who presented the report prepared by his group. The results of the study were also made available in a WGC2012 publication entitled, "Renewable Gas: The Sustainable Energy Solution". Amongst other information, this gives the definition of renewable gases, covers gas quality and utilisation, and looks at the economic, environmental and social aspects of biogas.

After the study group report, there were three presentations:

- ◆ The prospects of biogas production and use in the Russian Federation, Vladislav Karasevich, JSC Gazprom Promgaz.
- ◆ The use of biogas generated from swine manure as a preliminary agent of a biogas pipeline project development, Antônio R. Machado Jr, SCGÁS, Brazil.

▼ Juan Puertas and Naiara Ortiz de Mendibil with the Chair of TF 2, Soh Mey Lee (centre).







- ◆ Biomass gasification as an opportunity for gas companies, Marc Perrin, GDF Suez, France.  
The main conclusions were:
- ◆ Renewable gases are an opportunity for gas companies and the gas sector as a whole.
- ◆ The underground natural gas network is the most energy-efficient and environmentally friendly way to transport renewable gases as biogas and biomethane.

**Committee Session 6.2: Greenhouse gas (GHG) emission reduction efforts**

This session was attended by 93 people. It was chaired by Satoshi Yoshida, who, as well as being PGC A's Vice Chair, led Study Group A.3. The aim of the session was to present the report printed by IGU for WGC2012, entitled "Reduction of Greenhouse Gases: A Technology Guide". After the presentation of the report, a discussion was held between Satoshi Yoshida

▲ PGC A's Committee Session 6.1 was chaired by Elbert Huijzer (*far right*).

▼ PGC A's Committee Session 6.2 was chaired by Satoshi Yoshida (*far right*).







▲ Juan Puertas presenting a certificate to Bader Al-Mulla (Qatargas) who gave a presentation in PGC A's IES session.

and Scott Bartos from the US Environmental Protection Agency (EPA). Three papers were also presented:

Studies of greenhouse gas emissions at Gazprom: accounting, control & the best available technologies for emissions reduction, Greta Akopova, Gazprom Vniigaz, Russian Federation.

- ◆ Global gas flaring reduction in key countries, Brent Svensson, World Bank.
- ◆ Natural gas in Japan's post-Fukushima energy system & its CO<sub>2</sub> emissions reduction potential, Tomohito Okamura, Osaka Gas, Japan.

The conclusions of the roundtable were:

- ◆ The gas industry is making intensive efforts to reduce methane emissions to the atmosphere for economic and environmental reasons.
- ◆ Gas flaring continues to be a big problem for the oil and gas industry and it will remain an issue.
- ◆ The most crucial problem now is to detect and prevent free natural gas emissions in associated gas fields.

#### ***Expert Forum 6.A: The role of natural gas in the design of a hydricity model***

This session was attended by 47 people and was chaired by Vladimir Bashkin (Gazprom, Russian Federation), the leader of Study

Group A.1. After his introduction, four presentations were made on the following topics:

- ◆ Hydrogen energy development forecast, Anatoly Arabsky, Gazprom, Russian Federation.
- ◆ Development of a natural gas hydrate (NGH) supply chain, Satoo Nakai, Mitsui Engineering & Shipbuilding Co. Ltd, Japan.
- ◆ Environmental challenges in variable speed drive system (VSIDS) applications, Adriana Ferrara, Luca Bacchetti & Gianbattista Ramundo, ABB S.p.A. – Process Automation Division, Italy.
- ◆ Natural gas development & new city development: lessons for emerging economies, Nath Oyatogun, Shell Petroleum Development Company of Nigeria.

A roundtable followed to discuss the role of natural gas in the design of a hydricity (the complementary use of hydrogen and electricity) model by Bernard Blez (GDF Suez, France) and Isamu Yashuda (Tokyo Gas, Japan). The main conclusions were:

- ◆ Today, natural gas is the main fuel used to produce hydrogen. The annual hydrogen production is more than 30 million tonnes.
- ◆ Recent developments include injecting hydrogen into the natural gas network and mixing both products. This hydrogen is produced by electrolysis using excess electrical energy from wind farms.
- ◆ Gas companies need to prepare their networks for a gradual increase in hydrogen injection.

#### ***Expert Forum 6.B/2.A: CO<sub>2</sub> capture, transport and sequestration: technologies involved and project developments to increase gas industry sustainability***

This session was attended by 103 people. It was chaired by Gro J.T. Amundsen (Statoil, Norway) and co-chaired by Jacques Grappe (Geostock, France). In the first part of the session, the study report on "The Role of Carbon Capture and Storage (CCS) in a Sustainable Gas



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Industry” was presented. Then, four panellists gave presentations on:

- ◆ CCS options for electricity generation in south-eastern Europe, Mario Tot, IAEA and Damir Pesut, Energy Institute Hrvoje Pozar, Croatia.
- ◆ A field case of CO<sub>2</sub> storage & EOR, Abel Lins Jr, Petrobras, Brazil.
- ◆ Setting up electronic databases of global CO<sub>2</sub> sequestration projects, Vera Khvostova, Gazprom Vniigaz, Russian Federation.
- ◆ Development of innovative membrane for offshore high CO<sub>2</sub> sequestration, Faudzi Mat Isa & Fadhli Hadana Rahman, Petronas, Malaysia.

The main conclusions were:

- ◆ CCS is the most viable technology currently available to mitigate GHG emissions from large-scale fossil fuel usage.
- ◆ CCS could potentially play an extended role in developing a sustainable gas industry, beyond being simply a clean-up measure.

#### **Interactive Expert Showcase**

PGC A participated in the IES with a total of 10 posters divided between two sessions, with each author having a 15-minute slot to present their work. The first session was chaired by Satoshi Yoshida and co-chaired by Juan Puertas; and six posters related to sustainability were presented. The second session was a joint one with WOC 2. It was chaired by Gro Amundsen and co-chaired by Jacques Grappe; and four posters on CCS were presented.

#### **Youth Programme – Speakers’ Corner**

PGC A Chair, Juan Puertas participated in the first WGC Youth Programme with a presentation on “Balancing Sustainability and Investment: Natural Gas and Renewable Energy” during the Speakers’ Corner session. Afterwards, there was plenty of opportunity for interaction with the young people who are potential recruits to the gas industry. At the end of the session, the youth participants agreed that the world needs a sustainable

energy mix including some modern technologies and new energies that can be combined with natural gas, the cleanest fossil fuel.

#### **Programme Committee B – Strategy**

*Chair:* Dr Colin Lyle, Gas Market Insights Ltd, UK

*Vice Chair:* Fethi Arabi, Sonatrach, Algeria

*Secretary:* Harry Whitaker, BG Group, UK

For the 2009-2012 Triennium, PGC B was organised into three study groups to address topics on strategy, providing analysis of gas supply, demand, international trade, price formation and regulation. At the 25th WGC, PGC B organised three Committee Sessions and two Expert Fora, and participated in the Interactive Expert Showcase.

#### **Committee Session 7.1: Global supply, demand and trade**

This session was chaired by Jaap Hoogakker (GasTerra, The Netherlands), the leader of Study Group B.1, who presented the report prepared by his group. Dramatic changes during the last decade highlight the complex internal and external forces that have shaped the gas market of the world today, such as the rapid growth enabled by investment in gas production, international pipelines and the LNG chain. World-wide annual production and consumption of gas now exceeds 3 tcm and there is no doubt that globally the gas market will continue to grow.

Anne-Sophie Corbeau (IEA, France) followed with a presentation on global trade patterns of natural gas.

Dr Colin Lyle chaired a panel discussion with Daniel Champlon (Cedigaz, France), Alexander Medvedev (Gazprom, Russian Federation), Man-Fai Sham (Hong Kong and China Gas Company, China) and Gregory Vesey (Chevron, USA). The panellists presented a detailed outlook on each major gas region followed by a Q&A session. The main themes were:

- ◆ The growth of global LNG trade.
- ◆ Huge investments are required but there is also continued regulatory risk.





- ◆ The growth of demand in Asia-Pacific.
- ◆ The opportunity to have another bite at energy independence in US.

The session was well attended with 1,204 delegates.

### Committee Session 7.2: Wholesale gas price formation

This session was chaired by Mike Fulwood (Nexant, UK), the leader of Study Group B.2, who began by presenting – jointly with Floris Merison (GasTerra, The Netherlands) – SG B.2’s report. The main messages of the report included:

- ◆ The IGU Wholesale Gas Price Formation Survey for 2010 confirmed the continuing trend towards gas-on-gas competition and away from oil price indexation, most notably in Europe (see Figure 1).
- ◆ The divergence of gas prices around the world has grown as the increasing supply of shale gas in North America has led to a decoupling of Henry Hub prices from gas prices elsewhere in the world.
- ◆ The debate on the future of oil price indexation in European gas markets has intensified as spot prices and oil indexed prices diverge, causing tensions between buyers and sellers.
- ◆ Long-term trends in the main market sectors

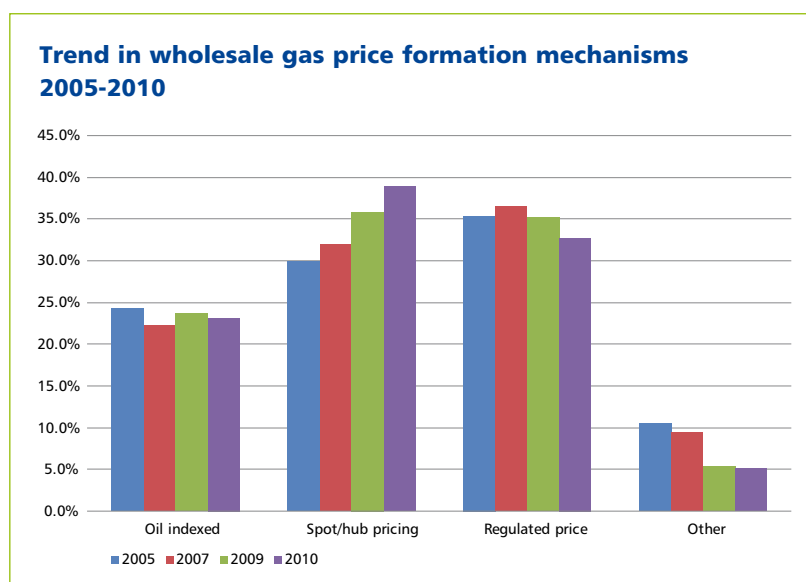
as regards competing fuels to gas are changing, notably in the power generation sector where coal has replaced oil as the main competing fuel to gas in many markets.

- ◆ Analysis from North American markets shows the role of price divergence and volatility in driving investment decisions.

Porter Bennett (Ponderosa Advisers, USA) then chaired a panel debate on the future of oil price indexation, which included contributions from Nick Blessley (Qatar Petroleum, Qatar), Betsy Spomer (BG Group, UK) and Jonathan Stern (Oxford Institute of Energy Studies, UK).

▲ PGC B’s Committee Session 7.2 was chaired by Mike Fulwood (left).

▼ Figure 1.



The divergent views of the panellists ensured that there was a lively discussion. The session was attended by 388 delegates.

### ***Committee Session 7.3: Corporate strategy and regulation***

This session presented the work of Study Group B.3 and was attended by 425 people. It was chaired by SG B.3's leader, Francisco de la Flor (Enagás, Spain), and co-chaired by Ram Ramanathan (Saudi Aramco, Saudi Arabia).

Francisco de la Flor began by giving a brief summary of the report's contents and explained how the work had been organised during the triennium. He pointed out that the main part of the report had been dedicated to corporate case studies and to starting cooperation between industry representatives (IGU) and the regulators' representatives worldwide (the International Confederation of Energy Regulators – ICER).

Ram Ramanathan was in charge of introducing the case studies. He explained the analysis of regulatory models around the world, and presented a series of examples to illustrate company responses to technical, commercial and regulatory changes throughout all parts of the gas value chain. His presentation was

followed by two analyses. Luis Ignacio Parada (Enagás, Spain) made a comparative analysis of the US and EU regulatory bodies, the Federal Energy Regulatory Commission (FERC) and the Agency for the Cooperation of Energy Regulators (ACER); and Milan Sedláček (Eustream, Slovakia) introduced a detailed description of the European Network of Transmission System Operators for Gas (ENTSOG).

Francisco de la Flor stressed the importance of having a stable, predictable and secure regulatory framework, with legal certainty as the key factor to attract investments.

Finally, a panel moderated by Colin Lyle brought together the expertise of Wilson "Dub" Crook (ExxonMobil, USA), who introduced "Regulation Inside of Companies"; Pallapa Ruangrong (Energy Regulatory Commission, Thailand, who presented "Regulation Views from Outside Companies"; and Francisco Salazar (Energy Regulatory Commission, Mexico), who presented the work carried out jointly by ICER and IGU during the triennium. The main messages from the report were:

- ◆ There has been an increase in the scope and the prerogatives of gas regulation, at supra-national (e.g., European), national and local levels.
- ◆ Laws and regulations have been implemented that address environmental issues.
- ◆ There are positive trends across the world in regulation but at different speeds.
- ◆ Cooperation between industry and the regulators is a prerequisite for success in this challenging but promising future.

### ***Expert Forum 7.A: Regulatory issues and business cases***

This Expert Forum was a follow-up to Committee Session 7.3. Both were a result of SG B.3's work during the triennium that addressed corporate gas business strategy and regulations. The forum was chaired by Ram Ramanathan and Dominique Jamme (CRE, France) and was attended by 150 delegates.

▶ Ram Ramanathan addressing PGC B's Committee Session 7.3.





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There were five presentations by industry experts giving their perspectives of gas regulations and their impact on regional gas industries.

Andy Hubbard (ExxonMobil, USA) recounted the history of market liberalisation and the development of a competitive market with greater liquidity. He described how regulations can facilitate sustainable supply growth and presented the outlook and challenges for continued progress.

Christophe Poillion (GRTgaz, France) pointed out the importance of market size and EU aspirations for larger market zones, and presented a framework for zone merger studies.

Luis Parada and Silvia Serrano (Enagás, Spain) noted the significant differences in gas regulations and policies across the world and proposed a methodology to evaluate and rank them using a regulatory quality and efficiency index.

Said Murad Serhan Seralioglu (Istanbul Gas Distribution Company, Turkey) reviewed the growth in Turkey's gas demand and imports, the 2002 Natural Gas Market Law of the Energy Market Regulatory Authority (EMRA) and

EMRA's efforts to liberalise the market, and related issues.

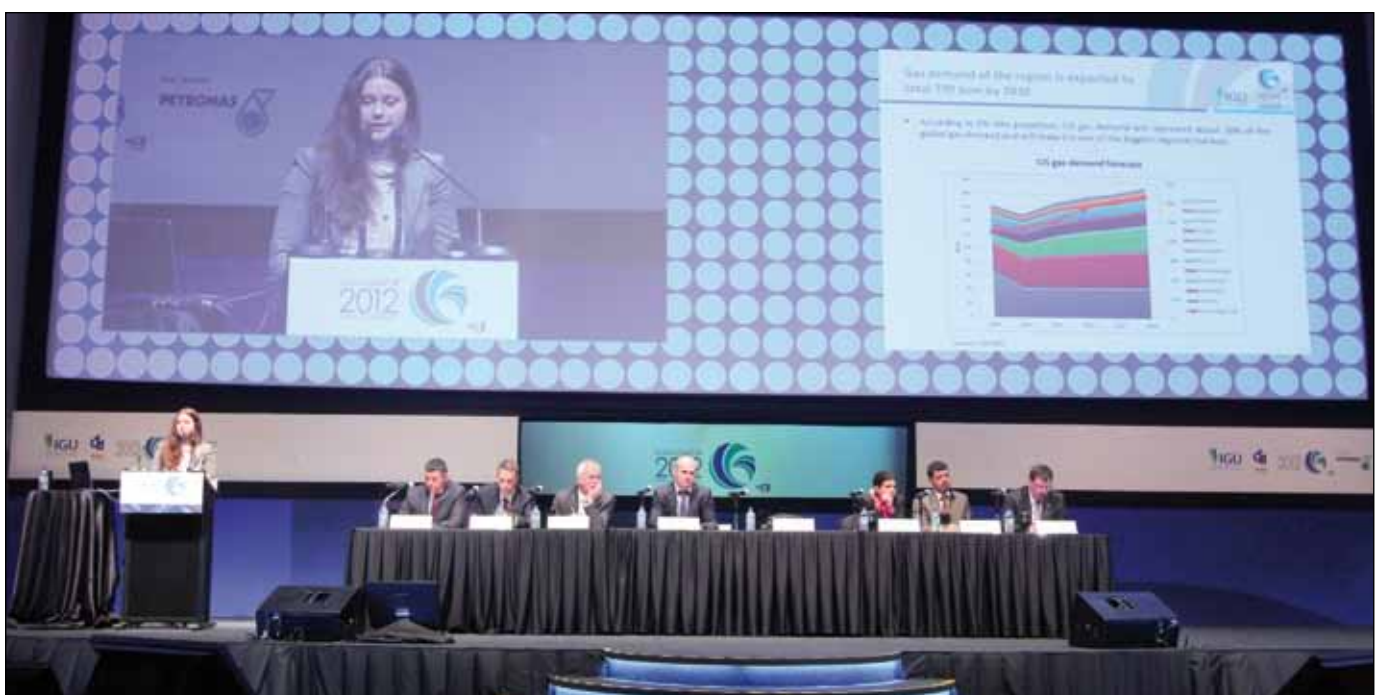
Finally, Mariano Ruiz (Apache Corporation, Argentina) and Emilio Nadra (Pan American Energy, Argentina) reviewed Argentina's gas supply and demand trends, the impact of regulated pricing, the 2008 "Gas Plus" programme to encourage gas developments, especially of unconventional gas (UCG), and the recent developments in UCG exploration.

**Expert Forum 7.B: Prospects and challenges for gas trade: "local views and global issues"**

This session was chaired by Fethi Arabi and Floris Merison and was attended by 168 delegates. The highlights of a study of views on the issues affecting gas markets and trades were presented. The key messages included:

- ◆ The North American "shale gale" has created the potential for a long-standing regional price disconnection. Market fundamentals and supply security issues are expected to prevent sustainable Asia-Europe price convergence. Therefore, a global gas price appears unlikely although an increasingly

▼ Ekatarina Grushevenko (Energy Institute of the Russian Academy of Science) addressing PGC B's Expert Forum 7.B.



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- ◆ In Russia, a new approach for domestic pricing could have significant effects on the gas market such as the improvement of internal efficiency. However, there are many economic and social risks related to a price increase and they need to be managed.
- ◆ In the CIS region, natural gas will remain the dominant energy source in the long term until 2030, and domestic gas demand will increase despite price escalation. The high energy saving potential will not be fully realised, due to a lack of investment in upgrading and replacing existing power generation capacities and also to insufficiently developed government programmes and initiatives in the energy efficiency area.
- ◆ India has the potential to be one of the world's fastest growing gas markets over the next 20 years, but the country needs to deal with four main issues:
  - 1 Insufficient domestic supply and potential reliance on LNG imports;
  - 2 Gas pricing with expensive LNG prices comparing to domestic gas prices;
  - 3 The stability of the regulatory framework and policy; and
  - 4 An underdeveloped transmission network, notably in the south and east of the country.
- ◆ Uncertainties related to the driving forces of globalisation do not support a trend towards a global gas market. Security of supply in Europe and Asia remains the major challenge for these regions. Therefore, stable long-term relationships between consumers and suppliers and integrated partnerships are ways of dealing with gas market uncertainties and ensuring security of supply.
- ◆ A significant build-up of renewable energy capacity in Europe does not offset the requirement for reliable conventional power capacity, in particular gas-fired power plants,

but the returns on existing and new plants become squeezed. More volatile and unpredictable gas prices will be driven by intermittent energy supplies from wind and solar. Consequently, the future might be not what it used to be, since renewables could turn gas and other fuels into a weather derivative.

### **Programme Committee C – Gas Markets**

*Chair:* João Batista de Toledo, Petrobras, Brazil

*Vice Chair:* Gi Chul Jung, Kogas, Korea

*Secretary:* Marcos de Freitas Sugaya, Petrobras, Brazil

For the 2009-2012 Triennium, PGC C set up three study groups to analyse the gas markets of ASEAN (SG C.1), North America (SG C.2) and the EU (SG C.3). At the 25th WGC, PGC C organised three Committee Sessions and two Expert Fora, and participated in the Interactive Expert Showcase.

### **Committee Session 8.1 Asia: gas market number 1?**

This session was chaired by Graeme Bethune (Energy Quest, Australia) who gave a brief introduction before handing over to Shigeki Sakamoto (JOGMEC, Japan), the leader of SG C.1.

Shigeki Sakamoto reviewed the markets in the region, pointing out the most important conclusions reached by his study group. Increasing gas demand means that the ASEAN bloc is moving from being a supplier to a net importer, with a number of LNG import terminals being developed. Northeast Asia has the largest potential in the region for natural gas, with China having the largest shale potential in the world (36 tcm). Nevertheless, the Chinese plan to produce 60-100 bcm/year by 2020 was considered to be unrealistic. Japan increased its LNG imports by 8.5 mtpa as a consequence of the complete nuclear power shutdown (54 plants delivering 49 GW) following the tsunami of March 2011. Demand for 2012 is around 85-90 mtpa, and diversification is pursued as a security of supply goal.





◀ There was standing room only for PGC C's Committee Session 8.2.

Oleg Ivanov (Gazprom, Russian Federation) described the current situation in China where there is significant potential for gas to play a bigger role in the energy mix. Coal consumption continues to increase, but its presence in the mix is expected to decline.

Nazlee Bt Abdul Aziz (Petronas, Malaysia) presented ASEAN as a region of solid economies, with demand growth varying from 1% to 5% and the most important demand driver being electricity. The Trans-ASEAN pipeline initiative continues, but the difficulties involved are not easy to resolve.

Kyoichi Miyazaki (Poten & Partners, USA) described a reduction in Henry Hub price volatility due to abundant unconventional gas production, and looked at projects to export LNG from the west coast of Canada to Asia.

### **Committee Session 8.2: Natural gas markets in North America: what's next?**

This session was chaired by James Trifon (Repsol LNG, USA) who began with a brief historical introduction to the North American gas markets. He mentioned that strong growth observed in the past was a consequence of: (1) individual land ownership; (2) stable regulatory processes; (3) availability of capital and

financial instruments; and (4) qualified personnel and equipment.

The development of an extensive, fully integrated transmission system was essential and this task was performed under a completely regulated business environment, whose costs were entirely supported by the final consumers.

Today, IOCs are responsible for only 20% of the production, which is dominated by the independent producers. Drilling activity is closely related to market prices, and the reaction is very fast.

Germain Manchon (GDF Suez, Mexico) pointed out that the Mexican gas market is the 11th largest in the world. Most gas is used to produce electricity, where the market is dominated by the state company CFE (65%). According to a recent EIA report, Mexico's shale gas resources are the fourth largest in the world (19 tcm) offering the industry a bright future. Changes in regulation could improve prices for consumers.

Denis Marcoux (Repsol Energy, Canada) said that Canada exported half of its gas to the USA but many pipelines are now operating below capacity following the increase in US shale gas production. He also pointed out that many coal-fired power plants have been displaced by

gas-fired plants, and that a number of LNG export projects are being considered on the west coast.

Leslie Palti-Guzman (Eurasia Group, USA) looked at how low prices are stimulating gas use in North America. A recent MIT study indicated that a reduction of 1.5 million b/d of crude could be achieved with a CNG conversion programme focused on professional fleets, while the corresponding gas consumption would be 85 bcm/year. The production of chemicals from gas is booming and a 25% increase in ethylene production capacity is being discussed. There are also some GTL projects under evaluation.

Richard Pratt (Fearnley LNG, USA) felt that the scope of LNG export projects in the USA would be limited, requiring a long-term commitment from the government and the concession of fiscal advantages. He also debated the impact of hedging and swaps on LNG trading.

### ***Committee Session 8.3: European natural gas at a crossroads: where to go from here?***

This session was chaired by Nuno Moreira da Cruz (Galp Gas Natural, Portugal), the leader of SG C.3, who pointed out that the European gas sector witnessed significant changes in demand, regulation and pricing during the triennium. He gave an overview of SG C.3's report, highlighting that it clearly indicates that natural gas addresses the main issues on the European energy agenda (sustainability, competitiveness and security of supply).

Robert Bosnjak (EIHP, Croatia) described the potential growth in a number of market segments (power, residential, industrial, vehicular, etc.), pointing out that there are large differences in forecast volumes. He stressed that the focus should be on value growth, and a number of levers were identified, including technology and some side products.

Zeyno Elbasi (BP, Turkey) described the current status of pricing and regulation in Europe, and the uncertainties that still surround the third regulatory package. Europe seems to be moving

away from total oil-indexation to a hybrid market where hub pricing plays a bigger role.

Luca Gatta (OMV, Austria) described a number of technical solutions to increase security of supply in Europe. The optimal solution is a tailored regional mix – market players must combine different sets of tools to improve security of supply in their region.

Finally, Julian Bowden (BP, UK) and Sergei Komlev (Gazprom, Russian Federation) debated spot pricing in hubs versus oil indexation. The first speaker presented the remarkable growth experienced by gas-on-gas competition in Europe, while the latter speaker presented evidence on the importance (to all relevant players) of maintaining a link to oil indexation.

### ***Expert Forum 8.A: Open markets, security of supply and demand***

This session was chaired by Marcos de Freitas Sugaya, who introduced the theme to be explored by the speakers, describing the importance of integrated, efficient and secure markets under the liberal vision that prevails today.

Tatiana Mitrova (Skolkovo Energy Centre, Russian Federation) gave a historical analysis of the mechanisms developed to promote security of supply and demand in Europe and Russia.

Karen Sund (Sund Energy, Norway) demonstrated the importance of new studies and scenarios to predict the behaviour of markets and understand future energy use.

Cees Hut (Gas Transport Services, The Netherlands) contradicted the confidence usually demonstrated by regulators in Europe, showing the difficulties experienced by the industry with the implementation of the third regulatory package.

Carlos Barberán (Mercados EMI, Spain), an arbitrage professional, described the current situation in India, where market demand is expected to be met by increased LNG imports.

Jeongwook Khang (Kogas, Korea) presented a contribution on the current situation in the Korean market.

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▶ Panellists in PGC C’s Expert Forum 8.A (chaired by Marcos de Freitas Sugaya, *third from right*) applaud Jeongwook Khang (*out of view*).

**Expert Forum 8.B: Perspectives for regional gas market developments**

Chaired by Gi Chul Jung Fereidun Fesharaki (FACTS Global Energy, Singapore) said that Japan’s increased demand for LNG would continue and that Chinese imports would soon overtake those of Korea, but not Japan. He considered the development of gas-on-gas competition in East Asia to be unlikely in the next 10 years.

Runmin He (CNPC, China) reminded the audience that Northeast Asia represented nearly

half of the total Asia-Pacific market. He diverged from Fesharaki to predict that China would be the largest importer in the region by 2030, and said that greater cooperation between China, Japan and Korea would be important to reduce prices and increase supply security.

Vyacheslav Kulagin (ERIRAS, Russian Federation) considered that exports from the Russian Federation to Asia could increase more than those to Europe, and that a Eurasian supply system was still a distant dream. Nevertheless, markets in Northeast Asia could be integrated.

▶ Cynthia Silveira (LEFT, watched by Jeanne Liendo) and Fereidun Fesharaki (RIGHT, watched by session chair, Gi Chul Jung) answer questions during PGC C’s Expert Forum 8.B.





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Jeanne Liendo (Universidad Simón Bolívar, Venezuela) said that geopolitical tensions, pricing volatility, a gas glut and development of unconventional gas were the most critical drivers changing the structure of gas markets.

Cynthia Silveira (Total, Brazil) described the Brazilian market, where gas has increased its share of the energy mix from 2% to 10%, and the oil and gas industry represents 12% of GNP. There is strong potential for an increase in supply, but large uncertainties in terms of volumes and dates.

Excel Theophilus Ukpohor (Nigeria LNG) explained that in certain regions of West Africa there is a mismatch between energy demand and natural resource endowments. He said that this can be overcome by the integration of regional energy markets. Examples are the West African Gas Pipeline (WAGP) project and the West African Power Pool.

#### **Interactive Expert Showcase**

Chaired by Milton Costa Filho (Petrobras, Brazil) and Nuno Moreira da Cruz, the IES session gave the opportunity to present another nine papers:

- ◆ Tad Dritz (Velocys, USA) said that there is now a good opportunity for GTL given the large price differential between natural gas and petroleum refined products such as diesel.
- ◆ Patricia Carneiro (Petrobras, Brazil) shared her study on how the current low prices in North America could stimulate the development of petrochemical projects.
- ◆ Michael Farina (GE Energy, USA) described a “fast blue” scenario, in which the displacement of coal by gas is stimulated, especially in Asia.
- ◆ Yanzhi Duan (CNPC, China) looked at the policy background and incentives for unconventional gas production in China.
- ◆ Luis Felipe Fernández Pérez, winner of the IGU Social Gas Award (see pages 46-48) presented his work.
- ◆ Mahmoud Hamada (Ernst & Young,

Switzerland) demonstrated the importance of storage in markets where gas-on-gas competition predominates.

- ◆ Water Peeraer (Fluxys, Belgium) described the construction of a second jetty in Zeebrugge, and the importance of hub interconnections to increase their liquidity.
- ◆ Mehdi Chennoufi (Shell Trading, UAE) described the markets in the region formed by the MENA bloc and the South Asia where strong population growth and local conditions favour LNG imports.
- ◆ Shivika Mehta (Hindustan Petroleum, India) and Mrinal Madhav (Ministry of Petroleum & Natural Gas, India) analysed the gas relations between India and China, which together consume nearly 25% of the world energy.

#### **Programme Committee D – LNG**

*Chair:* Alaa Abujbara, Qatargas, Qatar

*Vice Chair:* Dirk Van Slooten, Vopak, The Netherlands

*Secretary:* Abdulla Al Hussaini, Qatargas, Qatar

*Coordinator:* Jupiter Ramirez, Qatargas, Qatar

The work carried out by PGC D’s three study groups during the 2009-2012 Triennium was presented in three Committee Sessions and two Expert Fora at the 25th WGC. A total of 63 abstracts were submitted for consideration by the committee, of which 22 were chosen for oral presentation and 17 as posters in the IES, although only 13 posters were ultimately presented.

Attendances for all sessions were generally good, with audiences of between 203 and 355 for the Committee Sessions and 182-252 for the Expert Fora. Participants engaged in lively debates during the Q&A sessions.

#### **Committee Session 9.1: Enhance the compatibility LNG facilities**

This session was chaired by Jean-Yves Capelle (Total, France) and co-chaired by Sander Lemmers (Vopak, The Netherlands) and Richard Lammons, (Chevron, USA). The speakers and paper titles were:



- ◆ Richard Lammons, Study Group D.1 report.
- ◆ David Colson (GTT, France), Reduction in boil-off generation in cargo tanks of LNG carriers.
- ◆ Renaud Le Dévéhat (FMC, France) & Barend Pek (Shell Global Solutions, The Netherlands), Offshore LNG transfer.
- ◆ Juan Rodríguez (YPF S.A., Argentina), Escobar LNG.
- ◆ Marcellus Catalano (Qatargas, Qatar), The LNG oversupply that never occurred.

Richard Lammons presented SG D.1's report on the various organisations which either regulate or support the LNG industry and their impact on compatibility. LNG facility to LNG carrier compatibility was thoroughly studied with various aspects being discussed as well as future challenges. Considering the range of countries, authorities, industry organisations and independents involved in the production and management of global LNG regulations, the industry has managed to regulate itself quite well on a global scale. The LNG industry as a whole would benefit from streamlining and coordination of regulatory frameworks to simplify, ensure compatibility and eliminate duplication, and to support standardisation. This streamlining and increased coordination can be achieved through greater cooperation between non-profit organisations, regulatory and governmental bodies, LNG facility operators and consulting organisations, and will be a significant challenge as the industry continues to grow and diversify.

All the papers presented were of outstanding quality. A special mention should be made of the Shell/FMC presentation which received enthusiastic feedback.

### **Committee Session 9.2: Penetrate new markets for LNG**

This session was chaired by Ted Williams (American Gas Association, USA), the leader of Study Group D.2, and co-chaired by Izana Bt Mohd (Petronas, Malaysia) and Jorge Gomez de

la Fuente (Repsol, Spain). The speakers and paper titles were:

- ◆ Ted Williams, Study Group D.2 report.
- ◆ Christophe Liaud (EDF Group, France), Dunkerque LNG.
- ◆ Roger Bounds (Shell, The Netherlands), Impediments to improved market access for LNG.
- ◆ Philip Olivier (GDF Suez, France), Niche retail LNG.
- ◆ Steven Miles (Baker Botts, USA), Exports of LNG from North America.

Ted Williams presented SG D.2's report with the following key findings:

- ◆ Market drivers and barriers to the introduction of LNG must be divided into first-order fundamental drivers and barriers, and drivers and barriers to projects.
- ◆ Security of supply is a key driver and may be realised by price hedging, relief from physical supply constraints, increasing use of innovative technology solutions such as FSRUs, and relief in depletion of indigenous energy supplies.
- ◆ Diversity of supply is also important, providing price hedging and fuel switching opportunities, redundancy in supply infrastructure and opportunities for supply contract flexibility.

▼ PGC D's Committee Session 9.2 was chaired by Ted Williams and co-chaired by Izana Bt Mohd.



▶ Pawandeep Singh and Takayuki Yamamoto gave papers during PGC D's Committee Session 9.3.



- ◆ Shale gas may be both an impediment to the introduction of LNG and an opportunity, e.g. through gas market development before shale resources are brought into production.
- ◆ Power generation is a major driver for both new and mature markets, and through innovative technological solutions including small-scale generation and off-grid generation.
- ◆ “Non-traditional” drivers, including the use of natural gas as a vehicle or marine fuel, will be of increasing importance.
- ◆ “Structural” drivers and barriers are also important and include energy market regulation, industrial policy, environmental and energy portfolio requirements, and regulatory and governmental stability.
- ◆ Other important drivers and barriers include



rates of energy market penetration for gas, packaging of LNG projects, reloading and re-export opportunities, regional market and hub development, jurisdictional directives such as those of the EU, and risk response and aversion from events such as the Fukushima Daiichi tragedy.

### *Committee Session 9.3: Enhance efficiency in the LNG value chain*

This session was chaired by Rob Klein Nagelvoort (Shell, The Netherlands), the leader of Study Group D.3, and co-chaired by Calogero Migliore (Repsol, Spain).

Some 217 delegates attended the session, which was lower than expected given the high focus on LNG in the Far East. Asking around, our conclusion was that budget cuts in participating companies had more severely impacted the attendance of technical staff as compared to other disciplines. Nevertheless, the delegates attending were well motivated and up to speed with the LNG business, as was reflected in the nature of the questions and discussions following each presentation. Indeed, the session overran because of the number of questions.

Rob Klein Nagelvoort began by presenting SG D.3's report, which looked at the potential for increasing efficiency in the LNG value chain. Existing challenges were reviewed and alternative approaches were studied. The value chain was defined quite widely and included four parts: gas production, liquefaction, transport and regasification. Great progress has been made across the value chain, in terms of technical advancements and improvements in efficiency. Gas production has become more complex, resulting in higher costs and sometimes in higher energy consumption. Liquefaction and transport have become much more efficient, mainly by using new driver systems that have come on the market, and there is no end to the improvements yet. The number of regasification terminals has increased considerably, many of them of the floating type. The

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▲ PGC D's Expert Forum 9.B was chaired by Arrigo Vienna (far left).

regas processes are now more efficient, but there is only limited cold recovery or none. Overall, the LNG chain has become more efficient and it looks like this trend will continue.

Following the presentation of the study group report, four papers on related topics were presented:

- ◆ Advanced process control implementation challenges & success on mega LNG trains, Pawamdeep Singh, Qatargas, Qatar.
- ◆ New processes for second generation offshore liquefaction processes, Dominique Gadelle, Technip, France.
- ◆ The accomplishment of 100% utilisation of LNG cold energy, Takayuki Yamamoto, Osaka Gas, Japan.
- ◆ Improve energy efficiency in LNG production for baseload LNG plants, Christopher Chen, Chevron, USA.

#### **Expert Forum 9.A: LNG operational challenges**

This forum was chaired by Wouter Meiring (Shell, The Netherlands) and co-chaired by Azam Al Mannai (Qatargas, Qatar). There were five presentations:

- ◆ The club of major LNG producing countries: transformation trends, David Chau, Total, France.
- ◆ Adding value to plant performance, Olivier Denoux, Elengy, France.
- ◆ Effects of the large-scale earthquake

& tsunami on an LNG receiving terminal, Nobuhiko Takei, The Japan Gas Association, Japan.

- ◆ The rise of small-scale LNG/FLNG projects as an alternative approach to sustain global gas supply, Raj Rattanavich, Poten & Partners, Australia.
- ◆ Highly efficient & clean LNG plant concept, Heinz Bauer, Linde, Germany.

The presentation on the effects of the earthquake and tsunami in Japan left a particularly deep impression on the audience.

#### **Expert Forum 9.B: New LNG market developments**

This forum was chaired by Arrigo Vienna (ENI, Italy) and co-chaired by Heinz Bauer (Linde, Germany). There were five presentations:

- ◆ Innovation & partnerships in gas, John Gallagher, Shell, The Netherlands.
- ◆ Arctic LNG industry development: overcoming regional challenges, Dmitri Udalov, Gazprom, Russian Federation.
- ◆ An operator approach to FLNG: process selection & risk management, Denis Chretien & Eric Jeanneau, Total, France.
- ◆ Montoir LNG terminal development, Jean-Marc Le Gall, Elengy, France.
- ◆ LNG supply chain design & optimisation at Qatargas, Yitbarek Redda, Qatargas, Qatar. Arrigo Vienna deserved special recognition for securing an alternate presenter for the



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Gazprom paper as the original presenter had to cancel due to medical reasons. Since this session was scheduled in the late afternoon of Thursday, the Q&A session was divided into two parts with the aim of keeping delegates in the room until the end of the session. A quick, five-minute Q&A round was conducted after each of the presentations followed by a 15-minute Q&A session at the end. This format was successful in holding the interest of delegates until the end of the session and the questions were of a high standard.

#### **Interactive Expert Showcase**

PGC D's IES session was chaired by Neal Wood (Qatargas, Qatar) and co-chaired by Simon Frost (Repsol, Spain). There were 13 posters:

- ◆ Gas processing feed pre-treatment design approach on a floating LNG facility system, Zainab Kayat, Petronas, Malaysia.
- ◆ Automatic scheduling system for LNG storage operations using mathematical programming, Kenjo Tsuzaki, Osaka Gas, Japan.
- ◆ Successful real time optimisation of a highly complex integrated gas system, Derek Göbel, Shell Malaysia.
- ◆ Penetrating new markets for LNG, Jesco von Kistowski, Econogas, Austria.
- ◆ Enhancement of LNG facility maintenance methods, Takahiro Suematsu, Tokyo Gas, Japan.
- ◆ Adoption of frequency control of LNG pumps, Kenji Uchida, Tokyo Gas, Japan.
- ◆ Use of LNG as alternative to mitigate the energy crisis in western Venezuela, Sabrina Di Scipio, Simón Bolívar University & Javier Hernández, Ministry of Petroleum & Mines, Venezuela.
- ◆ Enhancing the viability of new LNG projects, Farrokh Kamali, Iran LNG, Iran.
- ◆ How liquefaction technology is evolving as the game changes towards unconventional gas monetisation, Nathalie Millot, Technip, France.
- ◆ LNG standardisation roadmap, Christophe Thomas, Total, France.
- ◆ Feasibility index for LNG regasification projects, Enrique Dameno, Stream, Spain.
- ◆ Current status of mixed LNG storage technology development, Kunihiko Ebato, Tokyo Gas, Japan.
- ◆ Development & realisation of large scale LNG storage tank applying 7% nickel steel plate, Hiroshi Nishigami, Osaka Gas, Japan.

#### **World LNG Report**

The World LNG Report 2011 was published and distributed at the 25th WGC. This is now a legacy document which will be continued in future triennia. The work was carried out by a PGC D Task Force working with PFC Energy. It was chaired by Mohd Seth Haron (Petronas) with Nikos Tsafos (PFC Energy) as a consultant and the other members were Jupiter Ramirez, Jean-Yves Robin (GIIGNL), Joop Jonkers (Vopak), Paco Freens (Qatargas), Izana Mohd (Petronas) and Razali Taib (Petronas).

#### **Programme Committee E – Marketing**

*Chair:* Marc Hall, Bayerngas, Germany

*Vice Chair:* Roland Mett, Gas Natural

Fenosa, Spain

*Secretary:* Barbara Schmid, Bayerngas, Germany

For the 2009-2012 Triennium, PGC E was organised into three study groups to look at the image of natural gas (SG E.3), how to market natural gas (SG E.2) and combinations of gas and renewables (SG E.1) today and in the future. At the 25th WGC, PGC E organised two Committee Sessions and one Expert Forum. Marc Hall also delivered a keynote speech as part of the first WGC Youth Programme.

#### **Committee Session 10.1: Energising the image of gas**

This session was designed as a multimedia show with a moderated panel discussion, films and interactive elements such as polling. It also offered a lively debate with the audience. The





session was chaired by Hansch van der Velden (NV Nederlandse Gasunie, The Netherlands), the leader of SG E.3, and was attended by 208 people. The panellists were Herbert Heitmann (Shell, The Netherlands), Susan Sakmar (University of San Francisco School of Law, USA), Roger Martin (Woodside Energy, Australia), Hokyong Kim (HR Energy, Korea) and Tim Egan (Canadian Gas Association).

The session addressed the following topics:

- ◆ A summary of SG E.3's report was given with a proposal of how to present the gas industry to stakeholders in the best way by taking the motto "Human, open and shaping the future" into account. The report concluded that the industry had to speak up, online or face-to-face, and reconnect with citizens and opinion leaders.
- ◆ A series of discussions followed, with the first on the theme "Getting back in the backyard". As the general public is becoming increasingly critical, it is necessary to improve the image of natural gas with local communities, local authorities, community leaders and other stakeholders.
- ◆ The second discussion was on "Selling an old fuel to a new world". Natural gas plays a pivotal role in developing a sustainable energy mix, but its role in the energy mix is often criticised. Natural gas is not seen as innovative and providing real solutions for a

low-carbon future. It also seems to lack (emotional) appeal for new talents. There was a discussion about how to convince stakeholders of gas being a future partner.

- ◆ The third discussion was on "Winning the ear of policymakers". Gas is sometimes described as the fuel without a voice, "The best story never told", and companies around the world struggle to get attention from policymakers. One essential element is how natural gas should be positioned versus other energy sources: nuclear, coal and, most importantly, renewables.

The videos shown in the session were interviews with ordinary people in different countries around the world (Brazil, France, Germany, Italy, Malaysia, Norway and others). They were asked questions about natural gas and the gas industry. The idea was to learn more about the image of natural gas and of the gas industry as seen by people outside the industry.

#### ***Committee Session 10.2: New ways in marketing strategies – best practices leading to success***

This session was organised as a panel session with presentations on different marketing topics related to the work of SG E.1 and SG E.2. It was chaired by Anton Buijs (GasTerra BV, The Netherlands) and was attended by 109 delegates.

▲ Roger Martin makes a point during PGC E's Committee Session 10.1.



▲ Anton Buijs addresses PGC E's Committee Session 10.2.

During the first part of the session, Urs Zeller (SVGW, Switzerland), the leader of SG E.2, presented the results of a survey on the business behaviour of wholesalers and retailers, and also looked at marketing strategies across different sectors today and in the future. He pointed out that marketing is an integral part of all business activities, and that each sector requires a different marketing approach which means a different use of marketing instruments. He also made clear that natural gas companies have to find their own marketing mix and take regional conditions and, in particular, customer needs into account.

Then, three authors of marketing papers presented their cases:

- ◆ Study on the natural gas marketing strategy of CNPC, Wei Li, PetroChina Natural Gas & Pipeline Company, China.
  - ◆ Promigas non-banking financing case study: an inclusive business, Silvia Adic Candil, Promigas, Colombia.
  - ◆ Understanding the natural gas consumers of the future – results of an empirical investigation & recommendations for the gas industry, Dominik Halstrup, University of Applied Sciences Osnabrück, Germany.
- In the second part of the session, Uwe Klaas

(DVGW, Germany), the leader of SG E.1, presented his group's report on gas and renewables. This looked at successful combinations of natural gas and renewable forms of energy in different countries, today and in the future. He described the trend for renewables to enter the market, which has been hailed by the media, governments and the general public, and emphasised the pro-renewable attitude that creates a good investment climate for renewables. He went on to describe the challenges and opportunities for new market alliances between producers of renewable energy and the gas industry in order to revamp the image of natural gas. He stressed that it is extremely important for the natural gas industry to develop new technologies, and said that the business model for natural gas and renewables would have a beneficial effect on CO<sub>2</sub> certificate trade.

Then, three authors presented their papers on different case studies.

- ◆ Merging natural gas with solar power generation: evaluating the potential of integrated solar combined cycle (ISCC), Alain Giacosa, Total, France.
- ◆ Gas storage is energy storage, Markus Mitteregger, RAG AG, Austria.





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▶ Tobias Münchmeyer and Samir Succar answer questions during PGC E's Expert Forum 10.A.



- ◆ The impact of renewable energy on natural gas consumption for power generation, Joost Wempe, GasTerra, The Netherlands. During the session, marketing films (from the Swiss Gas & Water Association, Audi e-gas and Ameland) were shown in order to illustrate different marketing strategies.

#### **Expert Forum 10.A: Renew your energies!**

This forum was set up as a panel session moderated by Marc Hall and Barbara Schmid with speakers from some of the most influential environmental organisations worldwide. Industry representatives were also invited to discuss the ecological transformation of energy supplies in an integrated energy system. The session included films and was attended by 82



delegates who engaged in a lively debate. The focus of discussion was mainly on CO<sub>2</sub> emissions, climate change and what was needed to make the CO<sub>2</sub> certificate system more effective. Solutions to mitigate climate change, a future for a low carbon-energy mix and the role of natural gas were also discussed.

The panellists and their main messages were:

- ◆ Pierre Bartholomeus, DNV KEMA, The Netherlands: "Gas enables flexibility and sustainability, and will play a crucial role in the future global energy system."
- ◆ Sven Becker, Trianel, Germany: "The age of the renewables – natural gas will make it happen."
- ◆ Tobias Münchmeyer, Greenpeace, Germany: "Natural gas is the cleanest of all dirty fossil fuels. Therefore it is not part of the solution, but the ultimate bridge to reach the solution."
- ◆ Masaki Tsukuda, Tokyo Gas, Japan: "Accelerate the introduction of renewable energy, focus on efficiency and use natural gas!"
- ◆ Rafael Senga, WWF International, Philippines: "WWF believes it is technically and economically feasible to achieve a 100% renewable energy supply globally by 2050 ... is natural gas still a transition fuel towards that vision?"
- ◆ Samir Succar, Natural Resources Defense Council, USA.

#### **Youth Programme**

Marc Hall participated in the first WGC Youth Programme with a keynote speech on "The energy future is gas". He said that natural gas is indispensable in the future energy mix and demonstrated that it has many advantages compared to other fuels, especially with regards to storage and transmission. He further explained that natural gas is not only a fossil fuel but can be renewable as well (biogas, production of synthetic natural gas by electrolysis). His presentation was well received by the young audience of approximately 100 delegates and led to a lively discussion.

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### Task Force 1 – Building Strategic Human Capital

*Chair:* Ieda Gomes, Energix Strategy Ltd, UK

*Vice Chair:* Rod Kenyon, Apprenticeship Ambassadors Network, UK

*Secretary:* Manu Kohli, BP, India

During the 25th WGC, TF 1 organised a Strategic Panel and a Committee Session. Ieda Gomes also gave a keynote speech as part of the Youth Programme.

#### *Strategic Panel 1: The future of natural gas: winning the race for talent*

This session was attended by an estimated 250 people and was chaired by IGU President, Datuk Abdul Rahim Hashim. In his opening remarks, Datuk Rahim explained that the Malaysian Presidency had put a strong emphasis on the issues of developing human capital and nurturing future generations. He expressed his hope that the industry would develop a common understanding on these issues and work together in further deepening cooperation to develop human capital. The panellists were:

- ◆ Antoine Rostand, Managing Director, Schlumberger Business Consulting.

- ◆ Alan Haywood, President Downstream Gas, BP Oil International Ltd.
  - ◆ Sarah Beacock, International & Professional Affairs Director & Acting CEO, Energy Institute, UK.
  - ◆ Kenji Uenishi, President, GE Energy, Asia-Pacific.
  - ◆ Peter Coleman, CEO, Woodside, Australia.
- The main conclusions were:
- ◆ The oil and gas industry is going through a major transition. Human resources (HR) represent the main driver for long-term production growth. Hundreds of thousands of skilled people will be required to deliver growth over the next five years.
  - ◆ High-growth companies have more technical people when compared to other peers and implement pragmatic HR policies such as: no barriers to promotion, higher diversity and on the job training.
  - ◆ Gender diversity is now a mainstream issue, except for majors who struggle to increase the proportion of women in their workforces.
  - ◆ Women find their careers in the oil and gas industry highly rewarding. A recent industry survey found that the things women value

▼ Datuk Abdul Rahim Hashim addresses TF 1's Strategic Panel.





most are: career progression and development, salary and benefits, equality, honesty, integrity and respect, a varied and interesting type of work and flexibility. However, for most women barriers still exist.

- ◆ Large international players are adapting from the old globalisation model to a new regionalisation model, focusing on the transfer of technical and leadership skills to local talent, more delegation of authority to locals, increasing local partnerships and enhanced relationships with customers.
- ◆ The industry needs to attract talent by enhancing its image, delivering a fulfilling career path by combining training with opportunity and recognition, and fostering a compelling sense of shared value.

#### **Technical Session: Building strategic human capital**

The session was chaired by Ieda Gomes and moderated by Rod Kenyon. It was attended by an estimated 237 people.

TF 1 carried out an analysis of the HR demographics and challenges facing the gas industry across the gas value chain. The work

comprised demographic surveys, case studies, expert interviews and examples of best practice. This covered competency issues, diversity and inclusion and management development. The results were published and distributed to delegates of the 25th WGC.

Ieda Gomes opened the session by explaining the background to the work of the Task Force. She said that the Malaysian Presidency of IGU had created two Task Forces in 2009 to address the issues around talent and nurturing future generations. During the triennium, TF 1 worked to understand and map the issues relating to the recruitment, development and retention of talent in the gas industry.

She was followed by Manu Kohli who outlined TF 1's approach to its remit. A variety of issues were addressed including ageing workforces, diversity, the image of the industry, relationships with higher education institutes and skills shortages. The work programme involved workshops, surveys and interviews with industry experts and young people. Meetings were held in London, Prague, Doha, Paris and Bilbao.

Gregory McGuire (National Gas Company of Trinidad and Tobago) described how his com-



◆ A question from the floor during TF 1's Strategic Panel.



▲ Ieda Gomes addresses TF 1's Committee Session.

pany, working with the government, had been able to address a shortage of technicians and engineers which had been identified in 2002. He said they developed partnerships with international oil companies (IOCs) to develop local human capital.

José Renato Ferreira de Almeida (Petrobras, Brazil) outlined the way the industry had grown and developed in Brazil. He drew attention to the large increase in investment and the way in which national qualification plans were produced. This allowed a detailed assessment of the qualifications needed to support the industry. He presented an overview of how many people and what qualifications were required to deliver Petrobras's ambitious growth goals across the oil and gas value chain.

Marius Popescu (Energy Delta Institute, The Netherlands) explained that TF 1 had conducted two surveys in 2010-2011: a demographics survey and a detailed HR benchmark survey. The demographics survey collected data from 80 companies covering upstream, midstream and distribution. The general conclusions from the survey work were:

- ◆ The "greying" of the industry varies across regions and segments.
- ◆ The shortage of technical skills varies across

regions and there is slow mobility of human capital.

- ◆ Talent poaching varies across regions; however, people seldom leave the energy industry.
- ◆ Companies try to retain, recruit and develop new talent to fill the knowledge gap. Many feel that this gap will increase in the future and what could be needed is a better image for the gas industry.

Ayush Gupta (GAIL (India) Ltd) looked at the challenges the industry faces in attracting and retaining staff and gave examples of what his company was doing. He stressed the need for a more systematic and integrated approach to creating an atmosphere for continuous learning and career advancement. He envisaged the emphasis moving from attracting and retaining to motivating and developing talent.

Elena Kasyan (Gazprom, Russian Federation) explained her role as head of personnel management for Gazprom, which has 300,000 employees. She referred to the changing demographics in Russia along with changes in professional education, and said that Gazprom sees employees as a key asset. She said that companies using modern systems of corporate education are able to respond to challenges by increasing the efficiency of personnel at short



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► Idea Gomes is thanked for her contribution to the Youth Programme.

notice. She pointed out that increasing the efficiency of employees by continuous education is cheaper for large transnational companies than recruiting new staff.

Elena Kasyan also emphasised that today's rapid technological changes require continuous training and development of human resources. Alongside individual knowledge there is also organisational or corporate knowledge, which is one of the major assets or intellectual capital of an organisation. Management of this type of knowledge is one of the most important issues in managing production and the business.

Anita Hoffmann (Executiva Ltd, UK) drew attention to the changing world of work and the emergence of new competencies, which has important implications for companies. Since 2008, business has operated at a faster pace and there are more interconnections and dependencies along with a wider range of stakeholders.

After questions from the floor, Ieda Gomes and Rod Kenyon closed the session and restated the general conclusions of the report:

- ◆ Natural gas will continue to play an important role in the energy mix.
- ◆ Human resources are one of the key elements in the growth of the sector.

- ◆ Skills and manpower issues are identified by companies and organisations as one of the key business issues.
- ◆ There is a negative perception of the industry in the eyes of young people starting out on their careers; the industry needs to proactively develop an engaging story.

TF 1 would like to thank its official sponsors, Total and Oman LNG, and offer special thanks to the support of Schlumberger Business Consultants and Energy Delta Institute and TF 1 meeting hosts BP, National Grid, Naturgas Energía, RWE/Czech Gas Association, the French Gas Association and Qatargas.

#### **Youth Programme**

Ieda Gomes was a keynote speaker in the first WGC Youth Programme with a presentation on "Mapping the gaps". She gave a summary of the work and conclusions of TF 1, and her views on the critical skills and capabilities which young people need to develop a successful career in the gas industry. The presentation was followed by an animated Q&A session, covering issues including career gaps, the role of women in the industry and the potential to develop an international career in the industry.

## Task Force 2 – Nurturing the Future Generations

*Chair:* Soh Mey Lee, AET Tanker Holdings, Malaysia

*Vice Chair:* Agnès Grimont, GDF Suez, France

*Secretary:* Jasmin Ramli, Petrosains, Malaysia

During the 25th WGC, TF 2 organised the inaugural Youth Conference and Carnival Programme, a Strategic Panel Youth/CEO Roundtable and a Committee Session. The world edition of the talent competition organised by TTA World of The Netherlands, NRG Battle, was also held at the same venue throughout the week. The Youth Programme was held at a dedicated venue on Level 19 of PETRONAS Tower 3, courtesy of KLCC Holdings.

A total of 253 delegates from all over the world participated in the WGC2012 Youth Programme. They were young professionals and students who were mostly sponsored by their respective companies, IGU Charter Members or national gas associations. About 30 of them were e-essay winners and another

60 were talented students who participated in the NRG Battle.

### *WGC 2012 Youth Conference and Carnival Programme*

The Youth Programme had two objectives. Firstly, to engage with young people so as to create greater awareness amongst them of the role of the global gas industry in the wider context of global energy and sustainable development. Secondly, to nurture interest in science, technology, engineering and mathematics (STEM) subjects so that more young people will pursue STEM-related training and qualifications.

The main components of the Youth Programme were Conference sessions, Carnival activities, a “Fun with Gas” Carnival at Petrosains and a Youth Night Out. All the activities and events were organised by young people for young people, within the overall theme of “Tag Your Future to Gas”. The Conference and Carnival sessions ran concurrently and each day had

▼ TF 2’s roundtable brought together selected young people and senior industry executives and was moderated by Geert Greving (*standing*).





▲ Puan Juniwati Hussin answers a question during the roundtable. In the background are Emma Cochrane and Brian Buckley.

a related theme: “Think About Gas”, “Talk About Gas” and “To Appreciate Gas”.

Debates were held in three thematic rooms sponsored by Total, Oman LNG and Halliburton, with Petronas and Shell as main sponsors of the Youth Programme. Interesting topics discussed revolved around career paths and loyalty, technology sharing and the business ethics of the industry as well as its future.

During the conference sessions, delegates had the chance to network with industry captains, interview prominent CEOs and express their views on the gas industry’s issues and challenges.

Exciting Carnival activities included Malaysian traditional games and food demonstrations, a Batik showcase and *Wayang Kulit* (a traditional puppetry show). These “Chillax” (chill & relax) activities aimed to let delegates relax and interact while they learned about Malaysian culture, reflecting on IGU’s global networking initiatives and the industry’s geographic, cultural and social diversity.

#### ***Strategic Panel 2: Youth/CEO Roundtable: The Magic in the Young Generations***

More than 400 people attended the Strategic Panel Roundtable dialogue between selected young people and a CEO panel. Moderated by Geert Greving (GasTerra, The Netherlands), the lively session was definitely an eye opener

for the industry and also a spur to take young people’s ideas, perceptions and interests seriously. The youth panel speakers were winners of the online essay competition organised via TF 2’s special website [www.itsnotmagicitsscience.com](http://www.itsnotmagicitsscience.com).

- The CEO panel consisted of:
- ◆ Puan Juniwati Rahmat Husin, Vice President of Human Resources, Petronas.
  - ◆ Hinda Garbi, President, Schlumberger Asia Pacific
  - ◆ Emma Cochrane, Vice President for Asia Pacific, Africa and Power, ExxonMobil Gas & Power Marketing Co.
  - ◆ Datuk Anuar Taib, former Country Chairman of Shell Malaysia (now Vice President of Development & Production, Petronas).
  - ◆ Dr Brian Buckley, CEO, Oman LNG.

#### ***TF 2 Committee Session***

This session was chaired by Soh Mey Lee and was attended by around 300 people.

There were six speakers and the aim of the session was to understand the drivers associated with filling and maintaining the gas industry’s talent pipeline, and securing the retention of talent. The drivers were elaborated by Professor Michael Kahn and Andrew Lee of Deloitte Consulting. Angel María Gutierrez and Juan Ramón Arraibi of Naturgas Energía outlined an initiative to attract the attention of university students and foster their interest in the gas industry by focusing on the company’s R&D work. Geertje Dam, Director New Business of TTA World, explained how the NRG Battle was established to help attract talent to the energy sector. Puan Juniwati Hussin, Vice President of Human Resources at Petronas, explained how the group seeds talent and then develops staff, taking them on to various stages of competency.

#### ***Fun with Gas Carnival***

Petrosains, The Discovery Centre hosted local and international school children for the Fun with Gas Carnival. The interactive science



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► The World NRG Battle was won by Team Alliander for a biogas grid proposal.

▼ The CEO of Petronas, Tan Sri Dato' Shamsul Azhar Abbas (*centre*) and IGU President Datuk Abdul Rahim Hashim flanked by TF 2's Chair, Soh Mey Lee (*left*) and Vice Chair, Agnès Grimont (*right*) with some of the delegates to the Youth Conference.

related activities targeted children aged between 5-17 years old and the general public. Dialogue sessions with industry experts were also organised to give visitors a glimpse of the gas industry.

**NRG Battle**

The NRG Battle-World Edition sponsored by Shell also took place as part of WGC2012 Youth Programme. The participants worked on chall-

enging cases provided by sponsored companies throughout the week and the final saw four teams presenting before a prominent jury panel. The winning pitch was presented by Team Alliander with their innovative dream for biogas. The team won a trip around the world.

**Publications**

TF 2 published a special publication entitled "Everything you want to know about gas but





◀ Tun Mahathir Mohamad, former Prime Minister of Malaysia, describes geopolitical levers during TF 3's Strategic Panel session.

were afraid to ask" as a commemorative book aimed at young people.

TF 2 also conducted a study on generational trends, lifestyles and career preferences, as well as young people's inclination towards STEM-related education. The study entitled "Nurturing the Future Generations" was carried out in collaboration with Deloitte Consulting and printed for distribution at the 25th WGC.

### Task Force 3 – Geopolitics and Natural Gas

*Chair:* Mel Ydreos, Spectra Energy, Canada

*Vice Chair:* Greet Greving, GasTerra, The Netherlands

*Secretary:* Jeff Okrucky, Union Gas, Canada  
Geopolitics and natural gas was identified as one of three special projects for the 2009-2012 Triennium. TF 3 was set up with responsibility for the study, including regional roundtables organised to examine the interplay of economic and political factors in the development of the increasingly international natural gas sector.

Significant effort was dedicated to solicitation of sponsors for TF 3's work. We are pleased to report excellent support on this

front, with the following line-up of sponsors:

- ◆ Royal Dutch Gas Association (KVG), premium sponsor.
- ◆ Chevron, WGC strategic panel sponsor.
- ◆ Gazprom Export, general sponsor.
- ◆ Eni S.p.A., general sponsor.
- ◆ CPC Corporation, Taiwan, partial regional roundtable sponsor.

▼ The TF 3 Committee Session was chaired by Mel Ydreos.







▲ Coby Van der Linde answers a question from the audience during TF 3's Committee session.

- ◆ Taqa Arabia, regional roundtable co-sponsor.
- ◆ Oman LNG, regional roundtable co-sponsor.
- ◆ Brazilian Petroleum, Gas and Biofuels Institute, regional roundtable sponsor.

We would like to thank those organisations that provided financial support for the work of the Task Force.

During the 25th WGC, TF 3 organised a Strategic Panel and a Committee Session.

### ***Strategic Panel 3: Impact of geopolitics on natural gas market development***

The Strategic Panel on geopolitics and natural gas was attended by more than 450 delegates. Marcel Kramer, CEO of South Stream, facilitated the discussion. Panel members included:

- ◆ Tun Mahathir Mohamad, former Prime Minister of Malaysia.
- ◆ Dr Bernard Bot, former Dutch Foreign Minister.
- ◆ Alexander Medvedev, Deputy Chairman of the Management Committee, OAO Gazprom, and Director General, OOO Gazprom Export.
- ◆ Abdelhamid Zerguine, Chairman and CEO, Sonatrach.
- ◆ Melody Meyer, President, Chevron Asia Pacific Exploration and Production.

During the session, Tun Mahathir Mohamad described various geopolitical levers available to governments. Dr Bot expanded on this discussion by explaining how and why geopolitical intervention comes about, and Alexander Medvedev provided an example from the European market, suggesting that European energy policy turns a blind eye to the benefits of natural gas. Abdelhamid Zerguine provided a description of the changing middle-eastern energy landscape, and Melody Meyer provided examples of how energy partnerships can help overcome geopolitical challenges. Marcel Kramer posed a number of questions to the panel members, encouraging a robust discussion.

### ***Committee Session***

The TF 3 Committee Session was chaired by Mel Ydreos and was attended by about 200 delegates.

The session began with a brief summary of TF 3's final report by Dick de Jong from the Clingendael International Energy Programme (CIEP). Dick de Jong and Coby Van der Linde from CIEP then responded to a number of questions from members of the audience. Coby Van der Linde is also a member of IGU's Wise Persons Group.

Following the final report overview, Mel Ydreos facilitated a panel discussion with a number of subject matter experts from various regions. The panellists included Jonathan Stern and Bassam Fattaouh from the Oxford Institute for Energy Studies in the UK, Sylvie D'Apote from Gas Energy S.A. in Brazil, and Yuji Morita from the Institute of Energy Economics in Japan. Panellists each spent a few moments providing an overview of regional geopolitical issues, and then debated a number of issues posed by the moderator or from the audience.

These sessions brought the work of the Task Force to a close for the Malaysian Triennium. However, during the French Triennium, TF 3 will continue further exploration and dialogue on the topic of geopolitics and natural gas.

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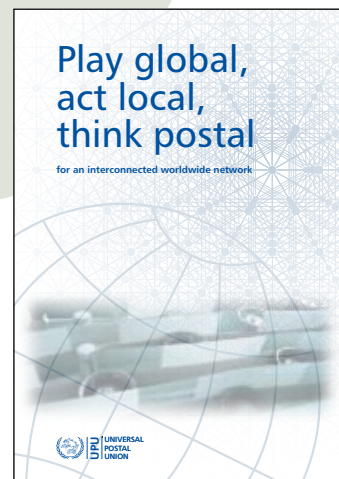
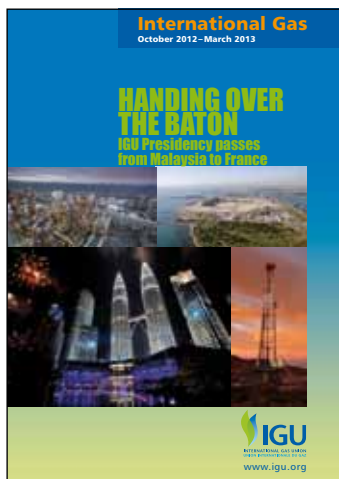
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# The New IGU Triennium

France was a founder member of IGU and has held the Presidency for two previous triennia – 1934-1937 and 1970-1973. Now, France is taking the helm again. In this special section, the President and Chair of the Coordination Committee outline the strategic guidelines and work programme for the 2012-2015 Triennium, which will culminate in the 26th World Gas Conference in Paris.

# The Strategic Guidelines for the French Triennium

By Jérôme Ferrier



▲ Jérôme Ferrier: gas has a key role to play in the fuel mix to drive sustainable economic growth.

The theme for the French Presidency, “Growing together towards a friendly planet” reflects the fact that gas has a key role to play in the fuel mix to drive sustainable economic growth throughout the world.

Natural gas is increasing its share of the global fuel mix. It is growing in importance due to its availability, environmental qualities in the context of climate concerns, economic and efficiency benefits and expanding infrastructure. Gas offers an immediate, cheap, efficient, clean, low-carbon, secure and flexible solution that can satisfy the needs of developing countries in particular, in combination with intermittent renewable energy sources for power generation, heating and cooling.

Sustainability is a major factor in ensuring robust future global growth. The proven and enhanced availability of gas will influence sustainable growth objectives, not least through the development and implementation of gas technology and resources throughout the entire gas chain from production to end-use.

In line with the theme and to reinforce IGU’s role in the gas industry, we have identified four strategic guidelines that constitute the basis for the Triennial Work Programme. These are to:

- 1 Obtain official recognition for natural gas as a destination fuel for sustainable development;
- 2 Promote an appropriate mix of gas and renewables and electricity;
- 3 Improve the availability of natural gas in new areas and in developing countries; and
- 4 Attract human resources and reduce staff turnover.

## Destination fuel

The industry has reached a crossroads. As the industry determines its future role, it desperately needs to adopt a consistent voice and message on natural gas. IGU is in a strong position to be the industry advocate and enhance the role that natural gas plays in responding to the demand for greater security of energy supplies, better economic performance and, in particular, in mitigating the environmental impact of climate change. Although the emphasis may vary throughout the world, there is a need for research and clear communications on these regional issues.

Climate change is a global issue. In a low-carbon world, natural gas will play a pivotal role – gas will be combined with investment in renewable energy sources to deliver economic and environmentally efficient solutions.

The French Presidency recognises the importance of gas advocacy and will continue to improve IGU’s gas industry advocacy programme, building on the key attributes and merits of natural gas and developing a communication strategy that will target each stakeholder group’s requirements.

Efforts must be maintained throughout the gas chain to maintain and develop the role and the competitiveness of natural gas.

## Appropriate mix

Natural gas must be combined with renewables and electricity production to maintain its pivotal role. If gas is to provide a future source of “friendly” energy for the world’s population, then one of the main future challenges for the industry is to grow alongside renewables.

Increasingly, gas players are integrating their activities either upstream with oil companies or downstream with power companies. The gas industry has to provide the right answers if it is to deliver the shiny promised future for its product. All industry efforts should be pooled to achieve this goal.

There is still a need to provide better access to markets. This can be done in a number of ways and in particular, through the development and application of new technology, via collaboration on major projects, through confidence in the right investment climate and the appropriate regulatory environment. The viability of upstream gas resources can be improved by lower costs for gas and LNG production, transportation, storage and distribution, just as better access to downstream markets can improve economic supply availability and stimulate downstream growth. These are all factors that can help make gas more acceptable. Natural gas can play a key role in reducing road transport emissions and in high efficiency distributed energy schemes. But these benefits will not be realised if the development of the gas industry is unduly constrained.

A larger, more integrated global gas industry will be well placed to help make the transition

to a carbon neutral society: upstream reservoirs can be used to store CO<sub>2</sub>; transmission pipelines can handle certain processed biogases or be used to transport hydrogen in the future; distributed natural gas can be converted into hydrogen for use in fuel cells to provide combined heat and power to energy efficient homes and businesses. These and other technology breakthroughs could provide economic solutions.

We must develop and promote clean gas and green gas technologies together with more efficient appliances, carbon capture and storage (CCS) and biogas or syngas production and distribution.

#### **Improve availability**

Global energy requirements continue to make increasing demands on gas supplies. While gas CARES for the world being Clean, Affordable, Reliable, Efficient and Secure, growth must be sustainable and shared between continents. Moreover, the benefits of gas must be as widespread as possible.

Sustainable growth aims to improve current conditions without compromising the ability of future generations to meet their own needs. This entails not only improving the availability



◀ The strategic framework for the French Triennium, which will culminate in the 26th WGC in Paris, is based on four pillars.



of gas by developing and implementing new technologies, but also recruiting the critical human resources needed to ensure that all the essential elements are in place and can be operated safely at optimum levels throughout the entire value chain.

To further drive gas sales in an increasingly environmentally conscious and cost sensitive world market, the gas industry must leverage technology and innovation and target specific growth sectors. Energy policy, regulation, gas pricing and risk management could have a major impact on the success of strategies for expanding downstream markets, whether in NGVs, power generation, cooling systems or new industrial uses.

Such growth in the gas sector portfolio is accompanied by the need to identify and manage a range of new challenges and risks. There is no doubt that efficient use of natural gas is vital for sustainable growth. Gas prices can be an important lever since they affect demand, provide investment signals, encourage more efficient use and stimulate the innovations that reduce overall costs. On traded markets where gas prices are sensitive to supply and demand, risks can be managed across the entire value chain, with effective innovative techniques used to handle volatility.

Traditionally, the focus for technical innovation and efficiency optimisation has been gas use and performance improvements in end-user appliances. Increasingly, that focus is being applied throughout the entire gas chain to bring improvements throughout the industry. The challenge is to provide a growing customer base with optimal volumes of gas, whilst lowering operating costs and simultaneously maintaining and investing in plants and equipment.

### **Human resources**

The first decade of this century has seen a shortage of technical skills hit a number of engineering and energy industries. Some

countries have already experienced acute shortages in gas industry expertise, with the effects felt in almost every section of the value chain. Safe operation is paramount. It is therefore essential to ensure that trained personnel are available in a timely manner to sustain industry growth and ensure that plants and equipment continue to be operated safely.

The problem is being exacerbated on both the supply side and the demand side. On the one hand, an increase in the numbers of experts reaching retirement is coupled with fewer students enrolling on technical/engineering courses. On the other, more trained staff are needed to handle new projects to meet the growth in the gas market. At the same time, existing pipelines and equipment require maintenance by qualified personnel to ensure safe operational conditions. As these factors come together, it is increasingly difficult to identify the specialised skills that will be required and to make sure that people are available when the industry needs them, and to reduce turnover by offering mutual benefits. How does the gas industry interact with other industries? Do we need to collaborate or will commercial solutions be found? Should governments get together to promote technology training? What approach to human resources will provide the best solution for sustainable growth?

The challenge is two-fold. Firstly, to ensure sufficient staff numbers and expertise for all parts of the future gas industry by increasing the emphasis on skills development. Secondly, to provide the foundations for longer-term prosperity and success by encouraging future generations to choose careers in science and technology in the energy industry, and the world of gas in particular.

Under the French Presidency, IGU will continue to study and propose solutions to this vital industry question.

*Jérôme Ferrier is the President of IGU.*

# The Triennial Work Programme 2012-2015

By Georges Liens

► Georges Liens: we are facing a wide variety of challenges.

►► Yves Tournié is the Secretary of the Coordination Committee.

▼ Table 1.

The Triennial Work Programme (TWP) for 2012-2015 is the result of constructive discussions with the outgoing and incoming committee authorities, subject experts and IGU management. The objective is to build on the progress made during the previous Argentine and Malaysian triennia, and to ensure the relevance of the studies to the strategic guidelines and current environment. We would like to acknow-



## Leadership of IGU Committees and Task Forces 2012-2015

Committee	Chair	Vice Chair
WOC 1 Exploration & Production	Denis Krambeck Dinelli Brazil	Adif Zulkifli Malaysia
WOC 2 Storage	Ladislav Goryl Slovak Republic	Nikita Barsuk Russia
WOC 3 Transmission	Benjamin Guzman Argentina	Jaroslav Petros Czech Republic
WOC 4 Distribution	Dietmar Spohn Germany	José Maria Almacellas Spain
WOC 5 Utilisation	Eugene Pronin Russia	Bijan Ochani Iran
PGC A Sustainability	Satoshi Yoshida Japan	Flavia Di Cino Argentina
PGC B Strategy	Fethi Arabi Algeria	Ulco Vermeulen The Netherlands
PGC C Gas Markets	Gi Chul Jung Korea	Sid-Ahmed Hamdani Algeria
PGC D LNG	Dirk van Slooten The Netherlands	Masanori Oki Japan
PGC E Marketing & Communication	Alfredo Ingelmo Torres Spain	Barbara Jinks Australia
PGC F R&D & Innovation	Jack Lewnard USA	Gerald Linke Germany
TF 1 Human Capital	Agnès Grimont France	Abdulaziz Mohammed Al-Mannai, Qatar
TF 2 Gas Advocacy	Michele Pizzolato Italy	Kevin Murphy USA
TF 3 Geopolitics	Geert Greving The Netherlands	Chang Keun Lee Korea

ledge the support and contributions of the Argentine and Malaysian Presidencies, whose input has been extremely valuable in ensuring a smooth transition between the triennia.

The TWP was presented to the IGU Council on June 4 and to World Gas Conference delegates during a special session on June 8. It will be carried out by Programme Committees (PGCs), Working Committees (WOCs) and Task Forces (TFs), with the Coordination Committee having overall responsibility for their performance. We warmly encourage all Charter and Associate Members to nominate individuals from their ranks to join the Committees and Task Forces.

The basic structure of PGCs and WOCs is largely unchanged. However, the scope of some of their work has been streamlined and redefined. In addition, a new PGC F has been set up to cover R&D and innovation and to take over the responsibilities of the former Technical Programme Committee of the IGU Research Conference (IGRC). PGC F will be responsible for preparing the technical programme for IGRC2014 and for work on R&D and innovation for presentation at WGC2015. Specific tasks in each committee are allocated to study groups (see *Tables 1 and 2 over*).

As regards the Task Forces, like our Malaysian colleagues before us, we believe that human



resources and education are central to the future of our industry. Moreover, in this complex world and globalised gas market, geopolitics is a driving force behind gas industry developments. These are areas that have serious potential implications for the future sustainability of the industry and merit further consideration. We are therefore maintaining the Human Resources and Geopolitics Task Forces during the French Triennium so that they can continue to study the issues and challenges in these fields. We will also be proposing to the Council that a new Human Capital Programme Committee be set up in the next triennium.

Another concern is the image of natural gas: how policymakers, international organisations and NGOs the world over perceive natural gas. While the world will continue to depend on

▲ The TWP was presented to World Gas Conference delegates during a special session.

► Table 2.

### Study Group Summary for the 2012-2015 Triennium

<i>Committee</i>	<i>Study Group</i>	<i>Topic</i>
WOC 1	SG 1.1	Recent advances in exploration and production of natural gas – technology
WOC 1	SG 1.2	Current and future developments in the exploration & production of natural gas – strategy
WOC 2	SG 2.1	World underground storage database
WOC 2	SG 2.2	Techniques and new opportunities
WOC 2	SG 2.3	Human resources: attracting students to storage activities
WOC 3	SG 3.1	New transmission projects
WOC 3	SG 3.2	Integrity management systems
WOC 3	SG 3.3	Public acceptance and new technologies
WOC 4	SG 4.1	Regulation on third-party access to gas distribution networks – a standard approach
WOC 4	SG 4.2	Diversification of gas quality and non-conventional sources in a carbon-free future
WOC 4	SG 4.3	Smart grids in gas distribution
WOC 5	SG 5.1	Industrial utilisation
WOC 5	SG 5.2	Domestic and commercial utilisation
WOC 5	SG 5.3	Natural gas vehicles (NGVs)
WOC 5	Topic Team 5.1	Renewables, CO <sub>2</sub> emissions, hydrogen
WOC 5	Topic Team 5.2	Efficiency and gas quality
PGC A	SG A.1	Carbon capture and storage
PGC A	SG A.2	Natural gas and renewable gas
PGC A	SG A.3	Life-cycle analysis of the natural gas chain
PGC A	SG A.4	Environmental aspects of unconventional gas



fossil fuels for most of its energy requirements in the foreseeable future, we believe natural gas has an important role to play in mitigating climate change. We are therefore setting up a new Task Force dedicated to Gas Advocacy which will consult experts and committee leaders, particularly the leaders of PGC A – Sustainability and PGC E – Marketing and Communication. This Task Force will increase our visibility and promote gas use by maintaining, improving and adapting the key arguments developed during the Malaysian Triennium and by launching lobbying activities at major forums such as the annual UN Climate Change Conferences.

To complete our work programme, we will continue to collaborate with other international organisations such as the International Energy Agency (IEA), International Energy Forum

(IEF), World Petroleum Council (WPC), World Energy Council (WEC) and other like-minded organisations.

### Conclusion

In a difficult climate we are facing a wide variety of challenges, including extending the benefits of our industry to emerging countries, and paving the way for a harmonious energy mix with renewables and electricity. Working together to find solutions to these challenges will provide IGU with the new ingredients it requires to ensure that natural gas is recognised as a key element in a future and sustainable world energy mix.

*Georges Liens is the Chair of the Coordination Committee.*

<i>Committee</i>	<i>Study Group</i>	<i>Topic</i>
PGC B	SG B.1	Global and regional gas supply, demand and trade scenarios to 2035
PGC B	SG B.2	Gas price formation and trends
PGC B	SG B.3	Corporate strategies
PGC C	SG C.1	Impact on natural gas of the worldwide anti-nuclear trend
PGC C	SG C.2	Implications of expansion in unconventional gas
PGC C	SG C.3	Security of gas supply and demand
PGC C	SG C.4	Energy poverty and lack of access to gas
PGC D	SG D.1	Remote LNG
PGC D	SG D.2	LNG as fuel
PGC D	SG D.3	Small-scale LNG
PGC D	SG D.4	LNG life-cycle analysis
PGC D	Special Report	LNG terminal report in cooperation with GIIGNL and SIGTTO
PGC E	SG E.1	Best practices of marketing and promotion of natural gas campaigns and their uses
PGC E	SG E.2	Competing with other energies: benchmark handbook on other energies
PGC E	SG E.3	Natural gas advocacy – communication handbook for local implementation
PGC F	SG F.1	Preparation of the technical programme for IGRC2014, liaison and participation in WGC2015
PGC F	SG F.2	Gas industry R&D
TF 1	Special Project	Human capital
TF 2	Special Project	Gas advocacy
TF 3	Special Project	Geopolitics

# Conviction to share

Imagine if a long-term energy future also depended on the discovery of new oil and gas resources

Although oil and gas resources are still plentiful, to satisfy growing demand both now and in the future Total continues to make significant discoveries. Relentlessly seeking to increase the productivity of oil and gas field reserves, we innovate to exploit new sources of fossil fuel. But because oil and gas are precious, it will be vital to focus their usage in those areas where it is hardest to replace: in transportation and petrochemicals.

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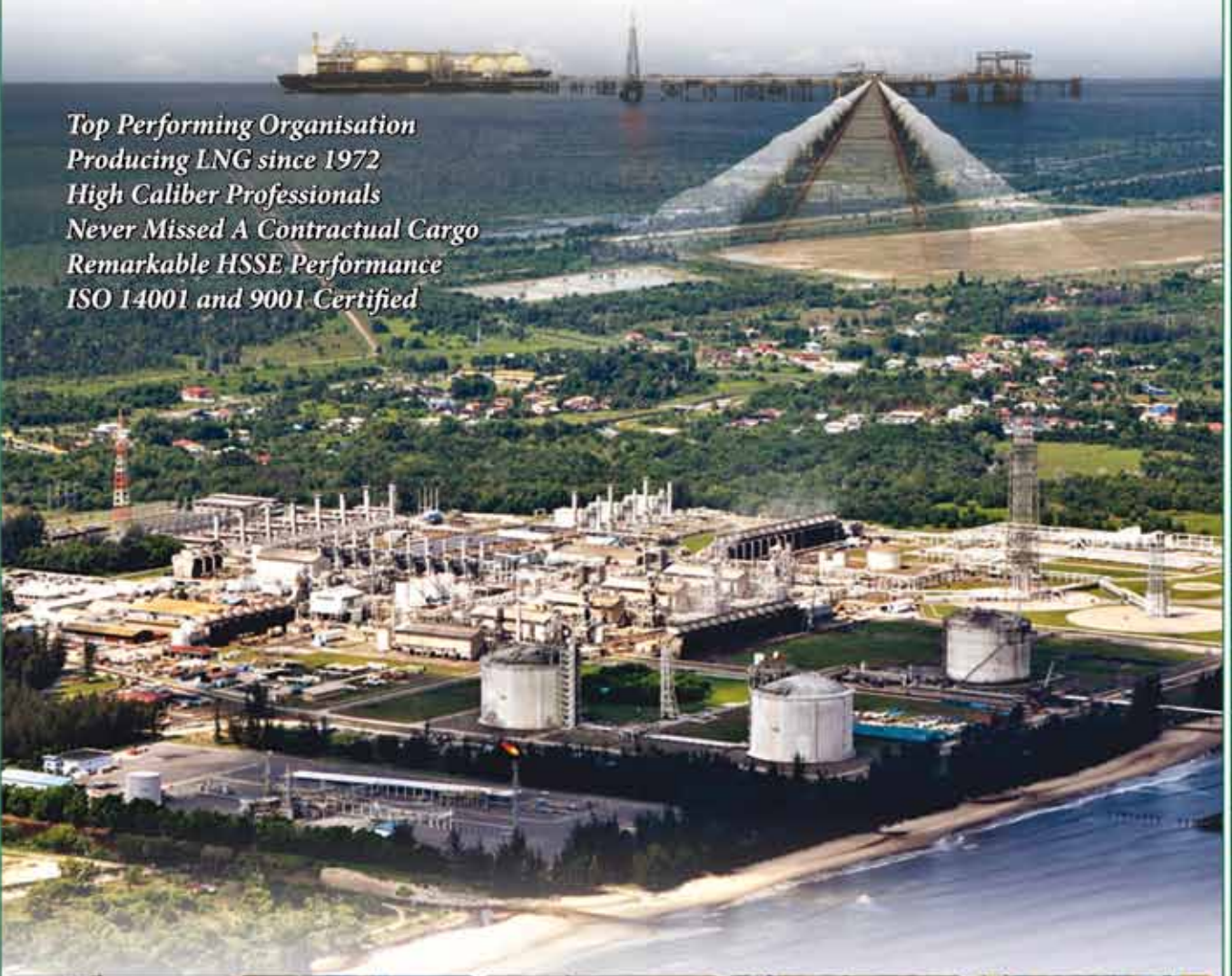
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# Features

This issue's features section is shorter than usual due to our coverage of the 25th World Gas Conference and the new triennium. We start with overviews of two important new IGU reports, one giving a "Global Vision for Gas" and the other outlining the facts about the environmental impact of shale gas operations. They are followed by articles describing the work of IPIECA, the global oil and gas industry association for environmental and social issues, and new rules for floating LNG facilities.

We round up with profiles of IGU's new Charter and Associate Members, a description of the publications and documents available from the Secretariat and the events calendar.



# Algeria, a reliable gas supplier

Algeria has played a historic role in the development of the gas industry, anticipating the place that natural gas should have for the fulfilment of energy needs by launching, as early as 1964, the first natural gas liquefaction plant in the world, known as the CAMEL (**C**omplexe **A**lgérien de **M**ethanol **L**iquide) delivering its first LNG from Arzew Terminal.

Over time, Sonatrach has proven its reliability in delivering more than one trillion cubic metres of gas to Europe without any interruption. This was made possible due to significant reserves and huge investments made since the early 1960s.

Beyond the LNG industry which will reach a total capacity of 63 million cubic meters thanks to the realisation of two mega trains in Arzew and in Skikda, three transcontinental gas pipelines have been built over the years, linking Algeria to its Euro-Mediterranean neighbours:

- The Enrico Mattei gas pipeline linking Algeria to Italy via Tunisia, with a capacity of 32 bcm per year.
- The Pedro Duran Farel gas pipeline linking Algeria to Spain via Morocco, with capacity of 12 billion bcm per year.
- The Medgaz gas pipeline connects directly Algeria to Spain with a capacity of 8 bcm per year.

These projects have been made possible through long-term contracts which ensure both security of supply and sharing of risk between Sonatrach and its customers. Pursuing our positive experience with different partners and strengthening our solid relationships, Sonatrach plans to invest more than \$80 billion for the next five

years, to intensify prospecting campaigns and to develop our refining and petrochemical sector.

It should be noted that Algeria holds important potential in terms of hydrocarbon reserves with 1.6 million square kilometres of sedimentary basins, two thirds of which have not yet been subject to any intensive prospecting campaigns such as some areas in the south-west and the north of Algeria. There is also a totally unexplored offshore area. In this context we intend to intensify exploration activity to renew our reserve base in conventional as well as unconventional resources.

Concerning this last point, a preliminary result of recent studies, based on an area of 180,000 square

kilometres, indicates enormous shale gas potential exceeding 600 mcm per square kilometre, meaning that more than 2 tcm can be recovered with the possibility of dry gas and liquids production.

Located in an unpopulated region of the desert, these reserves are subject to less environmental constraints and benefit from abundant water from the north-west Saharan aquifer and facilities and infrastructure which are available and already connected to gas export pipelines.

Sonatrach believes in a bright future for natural gas and will continue to contribute to the development of the industry through its investment efforts and the deepening of relations with its partners and customers.



Hassi R'mel gas production facility.



سوناتراش



سوناتراش

sonatrach



## 50 Years of Support to National Development سنة في خدمة التنمية الوطنية

Sonatrach is the Algerian state company for the research, exploitation, pipeline transportation, processing and marketing of hydrocarbons and their by-products. Its purpose is to make an optimum use of its hydrocarbon national resources and create wealth serving the country's social and economic development.

Today, Sonatrach is asserting itself not only as an international oil and gas-oriented group but also as a supportive, responsible and Citizen Company. It is committed to the economic, social and cultural development of populations; it has set essential priorities in terms of HSE, and became resolutely involved in environmental protection and ecosystems preservation.



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# IGU's Global Vision for Gas

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By Georgia Lewis

IGU's Global Vision for Gas was launched at the 25th World Gas Conference in Kuala Lumpur in June. The Global Vision outlines how gas can play an increasing role in the worldwide energy mix in the decades to come, up to 2050 and beyond. It takes into account a wide range of factors – the challenges faced by the global gas industry to continue to grow and the role of gas in a low-carbon future, including its environmental, social and economic benefits.

## Challenges

The report identifies six crucial challenges which will affect all world citizens over the coming half-century, and shows how the international gas industry is well-placed to meet them.

Population growth and resource availability represent the first challenge, with the world's population expected to increase from 7 billion to 9.3 billion by 2050. Fortunately, the world's resources of conventional and unconventional natural gas are abundant.

The need to foster economic development and employment is directly related to population growth. Natural gas is an enabler of economic development through the energy it provides to industries and households. The gas industry is also a major employer.

The third challenge is energy poverty and public health. Here, greater use of clean-burning natural gas can widen access to energy and help the developing world to overcome a dependence on polluting fuels such as coal, wood and dung.

Air quality and climate change, the fourth challenge listed in the Global Vision, is especially pertinent as the world strives to create a low-carbon economy and mitigate climate

change. Gas in power generation is a low-carbon option that can be used as an alternative to other fossil fuels, such as coal, as well as to complement intermittent renewable energies, such as solar and wind.

Mobility is the fifth challenge, with more opportunities for social and economic advancement available to those who are better able to travel and connect. Again, gas has an important role to play in a sustainable transport future.

The sixth and final challenge is affordability and, by ensuring gas prices remain competitive, IGU members can also be instrumental in helping countries ensure they achieve energy security.

## Goals

Striving to reduce CO<sub>2</sub> emissions and mitigate climate change within the 2°C increase threshold, as recommended by the United Nations Environment Programme (UNEP), is an important goal of the Global Vision.

UNEP made this recommendation in November 2011 and, in the short term, moving from coal to gas will result in significant emissions reductions, particularly in fast-growing regions such as Asia-Pacific, which is currently heavily reliant on coal. Greater energy efficiency will also help.

In the longer term, the Global Vision calls for more zero-carbon abatement options, development of carbon capture technologies and increased biogas production. This is outlined in the report as part of the Vision Pathway IGU has developed to meet the challenges.

The economic benefits of a well-developed international gas industry are also highlighted in the report as part of the Vision Pathway. It is expected that the worldwide abundance of

natural gas will ensure ongoing cost competitiveness in the decades ahead. As a primary source of energy for household and commercial use, gas is economically viable as well as a generator of employment. An example of how the gas industry is a major creator of jobs worldwide is cited – the United States has already experienced a positive economic impact as a result of developing shale gas production. This growth supported 600,000 jobs in 2010 and, of these, 150,000 were direct jobs and the remaining 450,000 were indirect or induced jobs.

### Conclusions

The report concludes that policy support is essential for stakeholders in the gas industry worldwide to continue to realise the recommendations outlined in the Vision Pathway. Policy support will be particularly important in areas where large emissions reductions are projected. Research and development will also be critical and made easier via policy support. This includes implementing policies that support the research and development of biogas, which will need to provide a bigger share of global gas supply post-2030.

In terms of gas supply, policymakers will need to take measures to allow the responsible development of unconventional gas internationally so the vast resources can be safely and efficiently exploited as a supplement to conventional gas.

In developing countries, the removal of subsidies wherever possible would be a positive policy change. Subsidies set gas prices below the cost of production and removing them could provide a powerful investment impetus to further develop the industry for the benefit of overall economies and inhabitants. Developing countries will also benefit from appropriate financial and regulatory incentives that are aimed at building the required infrastructure for gas to be an increasingly viable fuel.

Adoption of carbon pricing is another policy initiative the report concludes is essential if the

gas industry is to play a role in reducing greenhouse gas emissions. This would allow the industry to determine the ideal or lowest cost means of abatement without forcing policymakers to pick favoured technologies or fuels.

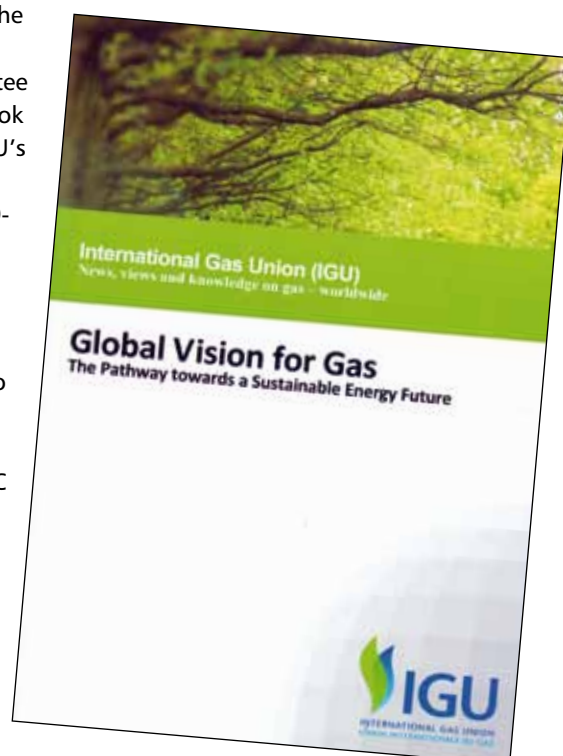
The Global Vision for Gas outlines a clear pathway towards a sustainable energy future that is both environmentally and economically viable, provided policymakers recognise the critical role gas has to play in a low-carbon future.

*Georgia Lewis is the Deputy Editor of International Systems and Communications.*

### Global Vision for Gas

The Global Vision for Gas was primarily written by Michael Stoppard, Managing Director of IHS CERA, with the support of Dr Daniel Yergin, Chairman of IHS CERA and a member of IGU's Wise Persons Group, and several other colleagues. It was prepared under the coordination of a Steering Committee headed by Ho Sook Wah, Chair of IGU's Coordination Committee (2009-12), and comprising Hans Riddervold (IGU Secretariat Director), Roberto Brandt (CC Chair 2006-09), Georges Liens (CC Chair 2012-15), Mel Ydreos (CC Chair-elect 2015-18), Lori Traweek (Senior Vice President, AGA), and Michel Romieau

(Consultant). It was also produced with the guidance and support of IGU President 2009-2012, Datuk Abdul Rahim Hashim, IGU Secretary General, Torstein Indrebø, and incoming IGU President, Jérôme Ferrier.





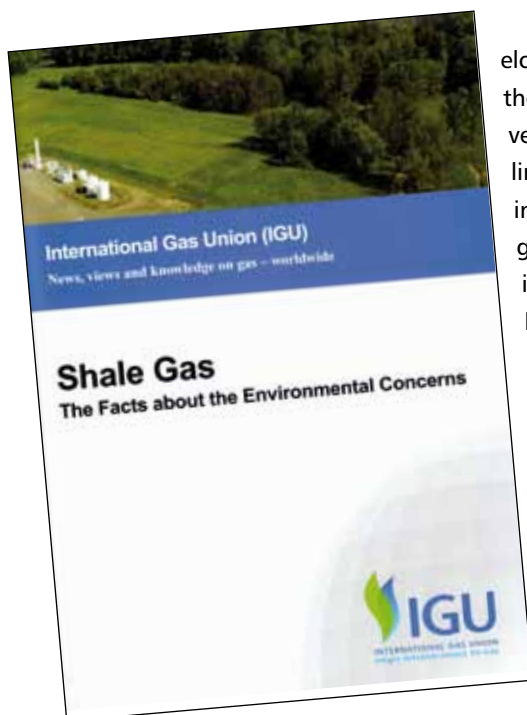
# The Discussion about Unconventional Gas – Some Facts

By Carolin Oebel

In recent years, one sector of the gas industry has been the focus of increasing attention within and outside the industry. That sector is unconventional gas, specifically gas extracted from geological formations with very low permeability – shale gas, tight sands gas and coal-bed methane.

For a long time, such gas production was considered uneconomical, but recent technological innovation has made extracting unconventional gas commercially viable. It is important to understand the nature of this innovation. The petroleum industry started by drilling vertical wells in the 19th century; horizontal drilling has been around for several decades; and hydraulic fracturing has been practised since the late 1940s. The innovation has been combining these technologies, and this was first done in the early 2000s in the Barnett shale formation in Texas, USA.

▼ IGU launched its shale gas publication during the 25th WGC.



These technological developments have transformed the US gas market. With conventional gas production declining, the USA faced an increasing need for natural gas imports. Now the boom in unconventional production has reduced imports, created a domestic supply surplus and might lead to the USA becoming a net exporter as some existing LNG import facilities are converted to export facilities. Cheniere's Sabine Pass terminal is the most advanced and is expected to start operations in 2015/2016.

Unconventional resources with production potential have also been discovered in other regions around the world, adding to the already plentiful conventional natural gas resource base. According to the IEA's 2011 World Energy Outlook, the estimated total world natural gas resource base is around 800 tcm.

However, at the same time as the global mapping of unconvensionals and production in the US – particularly of shale gas – developed, the voices raising environmental concerns became louder. Critics of shale gas production claim the process of drilling, extraction and processing is having negative environmental impacts which could lead to the contamination of water aquifers, or rivers as well as greatly increased greenhouse gas (GHG) emissions.

Over time, this discussion has become emotional and polarised. In order to contribute to a better understanding of the underlying issues surrounding shale gas production and to ensure a fact-based discussion, IGU has produced several documents summarising fact-based information about the shale gas production process and related regulatory actions, addressing the main concerns.

## Shale Gas – The Facts about the Environmental Concerns

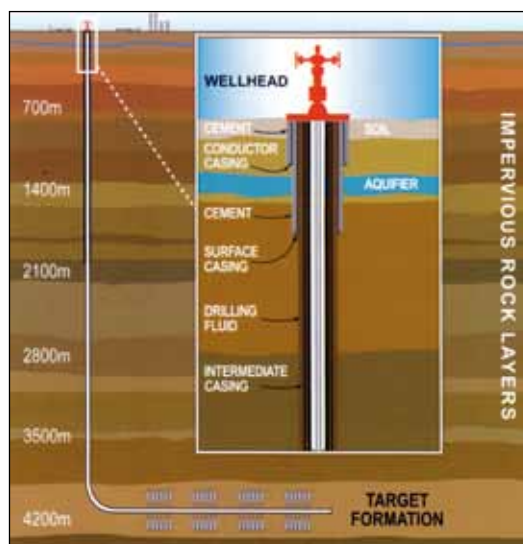
The IGU publication "Shale Gas – The Facts about the Environmental Concerns" was released at a special press conference on June 6 during the 25th World Gas Conference in Kuala Lumpur. It is available in print as well as electronically via the IGU website. It was produced under the direction of Mel Ydreos, Vice Chair of the IGU Coordination Committee since June 2012 and before that Chair of the IGU Task Force on Geopolitics.

After giving a short overview with illustrations of the standard shale gas production processes, the report addresses the main concerns raised in the context of the stages of the production process. As well as stating the relevant facts and illustrating them with graphs, pictures and charts, the report also provides a description of the context for each issue and a recommendation on best practices.

One often-raised concern is that hydraulic fracturing could have adverse effects on water aquifers and drinking water. The report points out that vertical drilling is a well-established practice and that millions of wells have been safely drilled through aquifers with no significant environmental issues occurring. Groundwater is protected during vertical drilling by a combination of protective casing and cement. In some extremely rare cases, groundwater was affected but this was due to faulty well casing installations, not hydraulic fracturing. These situations were resolved immediately and with no significant impact on groundwater. Furthermore, it is pointed out that most natural gas producing shale formations are 3,000 to 4,500 metres underground. Domestic use aquifers are typically less than 300 metres underground. Due to the fact that there is no physical path between the shale formations and the aquifers, the report sees no possibility for fresh water contamination through hydraulic fracturing.

Amongst a number of recommended industry best practices are: quality assurance programmes, auditing and training of all parties and practices involved to ensure standards are met. Furthermore, it is recommended that minimum well depths be set to guarantee sufficient distance between areas of hydraulic fracturing and water aquifers.

A related concern is that hydraulic fracturing fluids could contain dangerous chemicals that are not disclosed to the public. This concern is addressed by showing that hydraulic fracturing fluid is typically comprised of more than 99.5% water and sand and 0.5% chemicals; a typical



◀ Following industry best practices ensures that hydraulic fracturing is safe and efficient. This graphic shows a proper well-bore design.

fracture treatment will use three to 12 additive chemicals, depending on the characteristics of the water and the shale formation being fractured. Many of the chemicals used are present in common household and commercial applications and only some, which are used in extremely low concentrations, are toxic. Nonetheless, the composition of hydraulic fracturing fluids is controlled and they do not contact fresh water supplies. The report also highlights that the industry is taking steps to voluntarily disclose more information about the chemical composition of fracturing fluids and that several US states have established mandatory reporting requirements.

As one of the industry best practices it is recommended that companies invest in “green” or non-toxic alternatives to current fracturing fluid additives.

The complete list of concerns discussed and rebutted in the publication comprises:

- ◆ Shale gas drilling takes up a larger land-use footprint than does conventional energy production;
- ◆ Hydraulic fracturing can have adverse effects on drinking water;
- ◆ Hydraulic fracturing uses enormous quantities of water;
- ◆ Hydraulic fracturing fluids contain



▲ Small pads minimise the surface impact of UCG operations – this drilling rig was set up in the middle of the Arlington Campus of the University of Texas.

- ◆ dangerous chemicals that are not disclosed to the public;
- ◆ Hydraulic fracturing and associated wastewater disposal causes earthquakes;
- ◆ Disposal of wastewater harms the environment;
- ◆ Air emissions related to shale gas production are worse than those created by burning coal; and
- ◆ Shale gas extraction is not regulated.

### **Environmental Issues Surrounding Shale Gas Production – The US Experience – A Primer**

A more academic publication which addresses the shale gas revolution and its related environmental concerns was written by Terence H. Thorn earlier this year and will soon be updated. Mr Thorn held senior roles in major energy companies and, after retiring in 2000, set up JKM Consulting, an energy, environmental and business development consultancy. His paper – under the title “Environmental Issues Surrounding Shale Gas Production – The US Experience – A Primer” is available on the IGU website. As well as addressing the specific environmental concerns that are being raised in the USA, it provides a detailed overview of the regulatory initiatives being taken by the US

federal and state governments to address environmental concerns. The paper also looks at several government and academic studies analysing the possible risks related to shale gas extraction. These include studies by the Environmental Protection Agency (EPA) and Department of the Interior as well as the recommendations by the US Secretary of Energy’s Advisory Board.

In addition, the paper provides a brief overview of the history of the shale gas industry in the USA and gives an introduction to the main exploration and extraction technologies. It also explores last year’s downward revisions of potential US shale reserves.

The environmental concerns addressed in the paper are:

- ◆ Water use and wastewater disposal;
- ◆ Groundwater contamination;
- ◆ Methane emissions;
- ◆ Other air emissions; and
- ◆ Waste water injection causes minor earthquakes.

In the section dealing with methane emissions, Mr Thorn specifically looks at the arguments presented in a paper by Robert Howarth of Cornell University<sup>1</sup>. This paper claimed that life-cycle emissions from shale gas production could be greater than from coal. Mr Thorn reviews the criticisms concerning the completeness of the data used and some of the main assumptions. Professor Howarth uses, for example, a 20-year global warming potential (GWP) period to compare coal with gas instead of the more common 100-year GWP that the Intergovernmental Panel on Climate Change uses. Even though methane is a more powerful GHG than CO<sub>2</sub>, the long-term global warming footprint of gas will be considerably lower than the one assumed in the study due to the much shorter lifespan of methane in comparison with CO<sub>2</sub> – about 12 years for methane against over

<sup>1</sup> “Methane and the greenhouse-gas footprint of natural gas from shale formations,” *Climatic Change*, published online April 12, 2011.



100 years for CO<sub>2</sub>. Mr Thorn notes that a number of other studies analysing emissions from shale gas extraction also came to very different conclusions than the aforementioned study by Professor Howarth, including another study from Cornell University<sup>2</sup> showing that GHG emissions from shale gas would be only between a third and one-half of that from coal.

Having catalogued the continuous improvements in industry shale operations and the new regulations to mitigate potential environmental damage, Mr Thorn concludes that: “No energy produced, whether in or outside of the United States, is produced without risk and without some environmental cost. The extraction, processing and transportation of natural gas all affect the environment. However, expansion of the supply of natural gas permits the displacement of more polluting forms of energy.”

### Unconventionals in the future

Unconventionals have the potential to enlarge the world’s natural gas reserves considerably and therewith allow for a wider opportunity to make use of the benefits of natural gas. And here it is important to remember that although called “unconventional”, this resource comprises the same natural gas as “conventional” gas. In addition, further exploitation of unconventionals could improve security of supply for national economies by opening up a larger domestic resource base.

Realising this potential requires industry to establish trust with all the stakeholders. This means better and more transparent enforcement and record keeping, applying best practices and a clear regulatory framework based on a better understanding of risks – not just tighter rules.

It is crucial for the future development of other unconventional resources that the experience from shale gas development is well under-

stood and best practices are transferred to new production areas. It is also essential to take into consideration not only the different geological and geophysical aspects of other unconventionals but also regional variations in areas such as demographics and legal frameworks. All these aspects need to be considered when applying the best possible technology and ensuring a safe environment. Or as Lisa Jackson, EPA Administrator, put it in January 2012: “Fracking fluids will get greener, water use will go down, all because the industry, quite frankly, will do it, must do it and will feel the public pressure – not the EPA pressure – to do this in a responsible way.”

In addition to the publications described above, IGU has prepared a short tabular overview on basic information and the environmental concerns regarding shale gas based on the US experience. This is available on the IGU website and can be used as a brief introduction to the topic for those with little time.

*Carolyn Oebel is Senior Advisor to the Secretary General.*



◀ A number of companies are prospecting for shale gas in Poland and the first successful appraisal well – Lubocino-1 – was drilled by PGNiG.

<sup>2</sup> This study was conducted by L.M. Cathles III and others and was published online in *Climatic Change* on January 3, 2012.

# IndianOil: The Energy of India



IndianOil is India's flagship national oil company with business interests straddling the entire hydrocarbon value chain – from refining, pipeline transportation and marketing of petroleum products to exploration & production of crude oil and gas, marketing of natural gas and petrochemicals.

IndianOil is the leading Indian corporate in the Fortune Global 500 listing, ranked 83rd in 2012. With a workforce of over 34,000, IndianOil has been helping to meet India's energy demands for over half a century. With a corporate vision to be the **Energy of India**, IndianOil closed the year 2011-12 with turnover of \$85.55 billion and profits of \$791 million.

At IndianOil, operations are strategically structured along business verticals – Refineries, Pipelines, Marketing, R&D and Business Development – E&P, Petrochemicals and Natural Gas. To achieve the next level of growth, IndianOil is currently forging ahead on a well laid-out road map through vertical integration – upstream into Oil & Gas E&P and downstream into Petrochemicals – and diversification into natural gas marketing and alternative energy, besides globalisation of its downstream operations. Having set up subsidiaries in Sri Lanka, Mauritius and the UAE, IndianOil is simultaneously scouting for new business opportunities in the energy markets of Asia and Africa.

## Reach and Network

IndianOil and its subsidiaries account for over 49% petroleum products market share, 34% refining capacity and 71% downstream sector pipeline capacity in India. The IndianOil group of companies owns and operates 10 of India's 20 Refineries with a combined refining capacity of 67.05 mtpa. Indian Oil Corporation Ltd operates a 10,899 km network of crude oil, petroleum product and gas pipelines with a capacity of 75.26 mtpa of oil and 10 million m<sup>3</sup>/d of gas, which is the largest pipeline network in the country.



CNG Dispensing Station of IndianOil.

## Investment

With a steady aim of maintaining its position as a market leader and providing the best quality products and services, IndianOil is currently investing approximately \$8 billion in a range of major projects for augmentation of refining and pipeline capacities, setting up an LNG import terminal, expansion of marketing infrastructure and upgrading product quality.

## Redefining the horizon

Over the years, Natural Gas has emerged as the “fuel of choice” across the world. Natural gas marketing is a thrust area for IndianOil with special focus on city gas distribution and gas transportation. The corporation has entered into franchise agreements with other players to market CNG through its retail outlets.

During 2011-12, gas sales grew by an impressive 27% to 2.92 million tonnes from 2.3 million tonnes in the previous year. IndianOil is setting up a 5 mtpa LNG import, storage and regasification terminal at Ennore. This terminal would be the first of its kind on the East coast of India. Green Gas Ltd, IndianOil's joint venture with GAIL (India) Ltd, is already operational in

Agra and Lucknow in the state of Uttar Pradesh and is further expanding to cater to the increased demand in various sectors. Also, to have a footprint in gas transportation infrastructure, IndianOil along with GSPL, BPCL and HPCL have formed a joint venture to develop three cross-country gas pipeline projects extending to more than 4,200 km. This network would create connectivity from the Krishna-Godavari fields to Gujarat, central and north India.

IndianOil has the capabilities to supply regassified LNG to customers presently located in the northern and western regions of India. The “LNG at Doorstep” initiative involves making LNG available to customers not connected by gas pipeline. Gas is transported through a cryogenic system, stored in a cryogenic holding tank at the target location and regassified on-site through vaporisers for use as a fuel.

“Natural Gas has garnered a major position in the energy basket and has evolved as the primary source of energy. In times to come, the future of the hydrocarbon sector will continue to be highly dynamic, challenging and competitive.”

*Mr R. S. Butola, Chairman, IndianOil*

# Green Energy for a Greener India



Natural Gas, the cleanest of the fossil fuels is destined to play a vital role in ever growing India's energy demand. Gas is the sustainable energy solution that India needs to transform the living standards of over a billion people.

Driving this need is IndianOil... through Gas supplies to large Industrial Customers, Gas based power plants and Refineries.

IndianOil also provides customised gas solutions to customers who cannot access gas pipelines through its innovative 'LNG at Doorstep' facility. With new gas infrastructure like the LNG terminal at Ennore and City Gas Distribution networks in select markets, IndianOil is committed to Total Fuel Solutions to Households, Transport Systems & Industries.

**Building a Greener Energy future for India.**



**IndianOil**  
www.iocl.com



# IPIECA and Partnerships for Sustainable Development

By Brian Sullivan



▲ Brian Sullivan, Executive Director of IPIECA.

▼ IPIECA's members account for roughly half the world's oil production and a quarter of its gas.

IPIECA, the global oil and gas industry association for environmental and social issues, was established in 1974 in response to the formation of the United Nations Environment Programme (UNEP). Thirty-eight years later, IPIECA remains the oil and gas industry's principal channel of communication with the United Nations. Over the decades, the organisation's remit has expanded. Covering both the upstream and downstream sectors of the industry, IPIECA is devoted to improvements in environmental and social performance from the earliest phases of exploration to the end-use of the oil and gas that our members produce. IPIECA's vision is for an oil and gas industry that successfully improves its operations and products to meet society's expectations for environmental and social per-

formance, and works to achieve this by developing, sharing and promoting good practices and working in partnership with key stakeholders.

The association's membership is broad, with 35 company members and 16 association members including all the supermajors as well as national oil companies, independent producers and regional and national industry associations, accounting for roughly half the world's oil production and a quarter of its gas. It is a diverse membership that works together to develop consensus and progress across a broad range of issues in the areas of climate change, environment and energy, and social responsibility. The range of topics addressed is broad, with over 500 member employees involved in working groups covering the areas of biodiversity and ecosystem services, water, sustainability reporting, oil spill prevention and response, health, operations and products, supply chain, climate change and social responsibility.

IPIECA connects with several UN bodies, including the UN Framework Convention on Climate Change, the International Maritime Organisation and, of course, the reason the association was formed, UNEP. One significant activity has been participation in the Partnership for Clean Fuels and Vehicles, launched in Johannesburg in 2002. This is how the oil and gas industry, through IPIECA helped to eliminate the use of leaded gasoline in developing countries, with particular focus on Africa. Just over a decade ago, nearly 100 nations still relied on leaded fuel. By 2014, none will. In 2001 UNEP, the World Bank, IPIECA and others sponsored the first regional conference on the issue in Dakar where 25 African countries agreed to phase out lead by



the end of 2005. Building on this, the partnership launched a global push to eliminate leaded fuel. It worked. The result was one of the great environmental and health success stories of the early 21st century. UNEP Executive Director, Achim Steinar described this as “one of the major environmental achievements of the past few decades and a triumph of diplomacy and public-private collaboration”. The Partnership is a great example of how public-private partnership can deliver real progress on the ground and provides a template for sharing responsibility for sustainable development.

### Shared responsibility

IPIECA members are committed to the principle that sustainable development is a shared responsibility that needs action today. This is evidenced by their contributions to IPIECA and huge range of corporate initiatives. Our industry’s challenge is to continue to find and provide essential fuels in ways that are environmentally and socially responsible. Although investment is growing, renewables cannot satisfy global demand growth, so consumption of both oil and gas is set to continue to grow for the foreseeable future, meeting around half of the world’s energy needs in 2035. Oil and gas companies will continue to invest in new sources of supply as well as in researching and developing low-carbon energy sources and technologies, including advanced biofuels, other types of renewables and carbon capture and storage. The industry will play its part in further encouraging efficient use of energy.

The collective aim of IPIECA members is to operate responsibly; this means a commitment to safe, clean, reliable, efficient and ethical operations. One of the ways this is achieved is by working more efficiently and reducing greenhouse gas emissions from operations. Since 2007, the energy intensity in both the upstream and refining segments has fallen significantly. This is despite the need to drill



deeper, to exploit heavier oil deposits and older reservoirs, and to refine more intensively. Energy intensity is now below the level of the late 1990s, thanks to significant investments in energy-saving technologies.

IPIECA members also integrate biodiversity and ecosystem services good practice into their operations, and are constantly striving to reduce water demand. An example of collaboration in this area is Proteus. This is a partnership between oil and gas, mining and technology companies and the UNEP World Conservation Monitoring Centre (UNEP-WCMC). The goal of Proteus is to promote and protect biodiversity and ecosystems worldwide. The partnership aids company decision-making related to biodiversity by sharing expertise developed through ongoing data compilation and providing products such as database tools and online resources. Key achievements to date include improving the extent and accuracy of the World Database on Protected Areas, the only global dataset of this type.

Our members also promote respect for human rights in areas of operation, and environmental and social responsibility within supply chains. In June 2011, IPIECA launched a three-year initiative – the Business and Human Rights Project – that builds on the collective experience and practical know-how of

▲ IPIECA members are committed to safe, clean, reliable, efficient and ethical operations.



▲ IPIECA's Business and Human Rights Project was launched in 2011.

members in the area of business and human rights. The project's activities are designed to complement the existing capabilities of oil and gas companies in two key areas: human rights due diligence and grievance mechanisms. Practical guidance on both topics is being developed as part of the project. The business and human rights landscape has evolved significantly in the last five years and the project is designed to help oil and gas companies implement new and emerging

international guidance, such as the UN Guiding Principles on Business and Human Rights.

But conducting business in this way is not enough in itself. IPIECA members also recognise the oil and gas industry's responsibility to provide energy products that contribute to global economic and social development. The role of oil and gas in sustainable development is crucial. Oil and gas enables widespread economic growth. Moreover, the business of exploration, extraction, marketing and refining also provides economic and social development in itself. This happens by implementing programmes that encourage local content and capacity building as well as job creation and technology transfer.

Looking ahead, our industry is also investing in new technologies to meet both growing energy demand and the challenges of climate change, while collaborating with end users to improve efficiency in the use of our products. Business can better achieve sustainable development goals by working with others and the oil and gas industry, through IPIECA is dedicated to working together to attain these goals.

*Brian Sullivan is the Executive Director of IPIECA ([www.ipieca.org](http://www.ipieca.org)).*

## IPIECA

Established in 1974 as the International Petroleum Industry Environmental Conservation Association, IPIECA today has a wider remit as the global oil and gas industry association for environmental and social issues.





# IT'S TIME TO UNLOCK THE FULL POTENTIAL OF NATURAL GAS.



**WE AGREE.**

*Joseph C. Geagea*  
Joseph C. Geagea  
President, Gas & Midstream  
Chevron

Every day the world needs more energy. Oil alone won't be enough. So we're investing in the development of abundant, cleaner-burning natural gas. Off the coast of Western Australia, Chevron is leading one of the largest natural gas ventures in the world. Our commitment to projects like these is making the potential of natural gas a reality.



Human Energy®



# New Rules for FLNG Ensure Safe Operations

By Olivier Boijoux

*The first floating LNG (FLNG) facilities will be built in shipyards in Korea with a 1.2 mtpa unit for Petronas set to enter service in 2015 offshore Sarawak, Malaysia, followed in 2017 by a 3.6 mtpa unit for Shell offshore north-western Australia. Classification society Lloyd's Register has developed the first set of comprehensive rules for these complex structures.*

The gas industry is working to meet the world's growing demand for clean-burning natural gas. One area of innovation is FLNG, which allows remote gas fields to be developed where the cost of building pipelines to bring the gas to shore for immediate use or liquefaction would be prohibitive.

The first FLNG production and storage facility concepts were developed a few years ago,

heightening the need for design standards that combine the technology of floating oil-and-gas assets and LNG plants.

Typically, a floating unit will offer 50-75% of the capacity of a conventional LNG liquefaction facility, while using just 5% of the equivalent surface area; however, by design, they will also bring closer together gas storage areas and workers' living quarters. This in part illustrates the complexity of designing and operating them in a safe and reliable manner, and the need to adjust the current design and operating standards.

## Experience

Lloyd's Register classed the world's first ocean-going LNG carrier and has more than 50 years' experience developing rules for LNG carriers,

► Lloyd's Register classed the world's first ocean-going LNG carrier, *Methane Pioneer*, which crossed the Atlantic in 1959 and paved the way for the first commercial LNG carriers which entered service in 1964.



floating production storage and offloading (FPSO) units and, more recently, gas-fuelled tankers. The society has undertaken an ambitious programme to develop the first set of comprehensive rules for FLNG facilities, answering some of the technical challenges facing the sector.

In line with Lloyd's Register's standard practice, rules were first developed for each technical discipline, before integrating each discipline into a comprehensive FLNG product.

To facilitate the creation of the final document, a common framework for how Lloyd's Register would produce the rules was agreed and cascaded to all the authors. Authorised technical experts were identified and assigned to approve the output from each discipline.

Within the common framework it was agreed that the requirements for FLNG units should reside within Lloyd's Register's Floating Offshore Installation at a Fixed Location (FOIFL) Rules.

Part 10 of the FOIFL rules (which covers disciplines such as site-specific loading, project-specific service life, hull rules for generic mono-

hulls based on Common Structural Rules, etc.) were extended to cover FLNG units. This work is complete and approved.

A new Part 11 was created using the redrafted IGC code (the IMO's "International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk"), which currently serves as industry best practice for LNG carriers, as the base document. The disciplines covered by Part 11 include: containment systems, piping, machinery, process plants, electrical, control and fire-safety systems.

As part of the FOIFL rule update, each technical discipline was reviewed to inform a redrafted IGC code, indicating which chapters and paragraphs were kept, deleted or amended.

For example: the IGC code tank accelerations were replaced; the international carriage requirements were removed; and topside gas processing was added.

In addition, Lloyd's Register's bespoke requirements were appended to the relevant IGC code requirements, using a similar approach as was taken to produce the Rules for gas ships.

▼ The world's largest LNG carriers are the Q-max vessels. Lloyd's Register classed the first of them which was built at the Samsung Heavy Industries yard on Geoje Island, Korea (*three Q-max ships and one Q-flex are pictured*), where the Prelude FLNG vessel will be built.





Any best-practice requirements which were applicable to all ship units or floating offshore installation (i.e. oil FPSOs, floating storage units and tension-leg platforms – not just LNG FPSOs) still reside in the FOIFL Rules (i.e. parts 1 to 9).

The Rules also have been extended to offer guidelines for non-class items; for example, for the calculation of blast loads. This work is intended to help the operators and design contractors to adopt the safest approach for all aspects of the asset.

### Best practice

The FLNG rules consolidate engineering best-practice and the lessons learnt that are relevant to FLNG facilities, including from:

- ◆ Onshore petrochemical plants;
  - ◆ LNG, LPG carriers and product tankers;
  - ◆ FPSOs;
  - ◆ Floating LNG front-end engineering and design (FEED) projects; and
  - ◆ LNG loading and receiving terminals.
- They also consider:
- ◆ Plans and particulars;
  - ◆ Class notations;
  - ◆ Type approval of plant machinery;
  - ◆ Generic process plant and field-specific process plant (i.e. mercury removal, gas dehydration, acid gas removal, mono-ethylene glycol technology, oxygen removal, arsenic removal, etc.);
  - ◆ Utility plants;
  - ◆ References to standards for sizing of lines, fittings, valves and supports (for cryogenic operation);
  - ◆ Ship motions and environment loads on processes, plant equipment and supports (e.g. amine towers);
  - ◆ Offloading/transfer of LNG, LPG, condensate and vapour return systems;
  - ◆ Fire and blast safety;
  - ◆ Response to emergencies and unplanned events;
  - ◆ Topsides layout;

- ◆ Start-up and emergency shutdown performance;
- ◆ Control systems;
- ◆ Alarms;
- ◆ Instrumentation;
- ◆ Corrosion protection and other coverings;
- ◆ Waste disposal;
- ◆ National legislation; and
- ◆ Testing and in-water surveys.

### Peer review and release

The Lloyd's Register FLNG rules aim to address any shortfalls in the American Petroleum Institute (API), American National Standards Institute /American Society of Mechanical Engineers (ANSI/ASME) and other relevant standards, adding value to them, rather than replacing them. This results in a more concise rule-set consisting of Lloyd's Register-specific requirements and references to other excepted standards.

They are not biased towards particular processes or technologies employed on specific FEED or detailed design projects and, as such, are not subjected to specific project choices which might be influenced by cost considerations rather than best-practice for safety and the environment.

The rules will allow, where appropriate, for the use of alternative standards and emerging technologies, provided that equivalent or higher safety levels can be verified. In such cases, specific amendments to the rules will be prepared and properly documented, using the same approach as detailed above.

They are currently going through an extensive peer-review programme involving authorised technical experts (internal and external) and are expected to be ready for full release in the fourth quarter of 2012.

*Olivier Boijoux is the Global Head of FOI Business Development for Lloyd's Register Group Services, a member of the Lloyd's Register Group ([www.lr.org](http://www.lr.org)).*



# LET'S POWER OUR FUTURE WITH ENERGY WE COULDN'T USE BEFORE.

Shell led the industry when it committed to develop a Floating Liquefied Natural Gas (FLNG) facility last year. FLNG allows us to access sources of natural gas, the cleanest burning fossil fuel, that used to be too challenging to produce. Shell's first FLNG facility will be located above the Prelude gas field, more than 200 km off the coast of Western Australia. When built, it will be the world's largest floating offshore facility, equivalent in length to more than four football fields. Shell's ability to deliver this pioneering project is typical of our innovative approach to creating a better energy future. Let's power our future with gas.



**LET'S GO.**

**Search: Shell Let's Go**

To explore interactive stories on innovation in energy on your iPad, scan the code or search 'INSIDE ENERGY' in the App Store.



# Prospects for the Gas Industry in Cyprus, IGU's Latest Charter Member

By Solon Kassinis

Cyprus is an isolated “energy island” – it has no interconnections with the trans-European oil, gas or electricity networks. But Cyprus has ambitions to ensure a secure energy supply, enhance energy self-sufficiency and protect the island’s geo-strategic role. To achieve these goals, systematic plans and actions have been in development for the gas and electricity sectors over the past few years.

In addition, heavy dependence on imported oil and oil products has characterised Cyprus’s energy market. This, in turn, has driven efforts towards the import, supply and use of natural gas in the local market and industry, initially for power generation. For this purpose, an internal gas pipeline network will be established to distribute gas to the three power stations, other large industrial units and hotels. This network is currently in the design phase. Two combined-cycle gas turbines (CCGTs) have already been installed at the main power station, while the existing steam turbine units currently installed in all three power stations will either be decommissioned or converted to use natural gas in the near future.

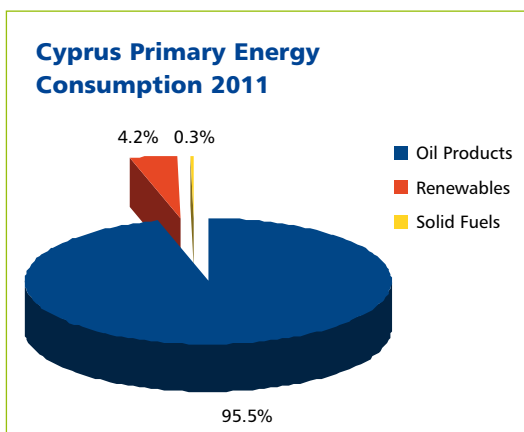
## Gas discovery

Cyprus’s neighbouring countries in the south-eastern Mediterranean commenced hydrocarbon exploration several decades ago. Likewise, Cyprus commenced its own hydrocarbon exploration activities within its Exclusive Economic Zone (EEZ) five years ago. The First Licensing Round was held in 2007, which resulted in the granting of a hydrocarbon exploration licence to Noble Energy International Ltd for Exploration Block No. 12.

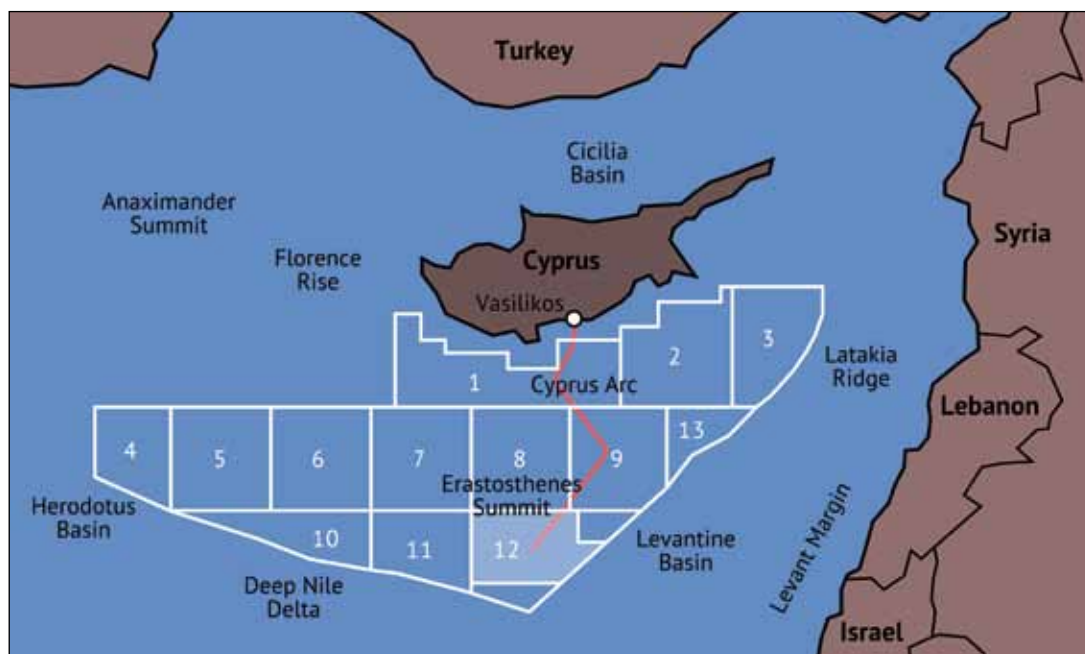
In December 2011, a natural gas discovery in Block 12 was announced. It was of considerable size – 198 bcm gross mean estimated resources. Upstream developments are now in the planning stages with discussions taking place on various technical and commercial issues. The first gas from Block 12 is expected in 2018, and gas exports are expected to commence in 2019.

Development projects on the upstream side include facilities for gas collection and processing infrastructure. Gas supply from the discovery in Block 12 will be via a sub-sea pipeline. For gas exports, the option of

► Cyprus relies on oil products (*below*) for its current energy requirements with renewables – mainly solar – in second place (*below right*).







◀ Cyprus held its first hydrocarbon licensing round in 2007 and gas was discovered in Block 12 in December 2011. The red line shows the path of the sub-sea pipeline that is planned to bring the gas onshore.

establishing a liquefaction plant in Cyprus is under study. It is expected that the plant will initially produce 5 mtpa, rising to 15 mtpa in the longer term.

In early 2012, the Second Licensing Round was held and interest was strong in the remaining offshore blocks. There were 33 applications for licences made by 15 consortia/companies from various countries around the world. The bids are being evaluated and licences are expected to be awarded in 2013.

Undoubtedly, the discovery of substantial quantities of natural gas within the EEZ of Cyprus, in conjunction with the potential utilisation of other gas deposits and future gas discoveries in the area, gives new impetus to the development of the gas industry in Cyprus.

It is evident that with the recently announced offshore natural gas discovery, Cyprus is transitioning to a new era with a promising energy sector. Cyprus has a lot to gain from the utilisation of gas for its own energy needs and will gain even more from the broader economic benefits. Harvesting its own gas fields will boost the local industry and drive the manufacturing and industrial

sector in Cyprus to a higher technological level. Potential projects that could be part of the future gas industry in Cyprus – apart from the LNG plant – could include petrochemicals manufacturing plants (such as polyethylene and methanol production plants), using natural gas as feedstock.

### Cyprus and IGU

As the competent governmental body for energy matters in Cyprus, the Ministry of Commerce, Industry and Tourism will aim, through its membership of IGU, to share experiences in the field and disseminate and exchange relevant information, actively participate in the main activities in the sector, access valuable information and publications, monitor the developments in the sector, develop strategic relations with other members of IGU and, last but not least, promote Cyprus's activities in the natural gas industry at an international level.

*Solon Kassinis is Director, Energy Service in the Ministry of Commerce, Industry and Tourism of the Republic of Cyprus ([www.mcit.gov.cy](http://www.mcit.gov.cy)).*

## Presenting IGU's New Associate Members

*New members of IGU are invited to contribute a profile of their organisations to the IGU Magazine. In the last issue we featured the four Charter Members whose membership was approved at the Council meeting in Dubrovnik in October 2011. Now it is the turn of the new Associate Members. Here we have contributions from the Australian Petroleum Production & Exploration Association (APPEA), DNV KEMA, OMV, Wintershall and Woodside.*

### APPEA

The Australian Petroleum Production & Exploration Association (APPEA) is the national body representing Australia's upstream oil and gas industry.

APPEA has more than 90 full member companies (oil and gas explorers and producers active in Australia) and more than 250 associate members, which provide products and services to the industry.

APPEA works with Australia's national and state governments to advocate and develop

policies that promote investment and facilitate safe and sustainable development of the country's oil and gas resources.

APPEA seeks to increase community and government understanding of the industry by publishing information about the sector's activities and its economic importance to the nation. It also hosts several conferences and forums for exchanging ideas and contributing to the development of the association's policy positions.

Australia's petroleum industry directly contributed almost \$37 billion in income to the national economy in the 2010-11 financial year.

The country has a number of oil projects but it is better known as a gas producer and exporter. LNG export projects and coal-seam gas (CSG) – as coal-bed methane is called in Australia – are driving most of the growth, but the country also has a strong domestic conventional gas sector and significant potential for shale gas.

Australia has the world's most ambitious and innovative LNG expansion plans. The industry currently has seven new LNG developments worth a cumulative \$175 billion under construction. Several other projects are on the drawing board but not yet committed.

Australia is expected to produce about 24 million tonnes of LNG in 2012-13. But by 2020 the projects now under construction will push annual production beyond 80 million tonnes and make Australia the world's largest LNG exporter.

The country has two longstanding LNG projects (North West Shelf and Darwin LNG) and its third LNG project – Pluto – began production in 2012.

Chevron, ExxonMobil and Shell are building Gorgon LNG, which will produce 15 mtpa from its

▼ David Byers,  
CEO of APPEA.



start-up in 2014 and may be expanded. Chevron has also begun work on Wheatstone LNG.

Australia is also leading the world in the development of CSG and is developing the world's first CSG-fed LNG projects, with three major CSG-LNG projects presently under construction. And the world's first floating LNG (FLNG) project to achieve FID will be hosted by Australia. A South Korean shipyard is now building an FLNG vessel for Royal Dutch Shell's Prelude field.

As the voice of the petroleum industry in a major gas-exporting country, APPEA has chosen to join IGU. APPEA supports IGU's advocacy of the global gas industry and its promotion of new technologies and best practices in order to spread the economic and environmental benefits of gas.

As the world seeks greater supplies of cleaner energy, the work of the gas industry and its major bodies is becoming increasingly important.

*For more information visit [www.appea.com.au](http://www.appea.com.au).*

### **DNV KEMA**

With a reliable and sustainable energy system and an essential role for diversified gas in mind, 2,300 experts of DNV KEMA add value to the businesses of their customers by offering in-depth technical knowledge and business consultancy, testing & certification and verification services. The gas experience from DNV KEMA originates from many decades of experience in natural gas for Dutch transmission system operator (TSO) Gasunie. Since March 2012, DNV KEMA has been part of the DNV Group strengthening our position in the global gas market.

### **Balancing cost, performance and risks**

The pressure to manage capital equipment more efficiently is driven by economic motives as well as regulations. DNV KEMA provides gas companies with decision support services, including

benchmarking, performance optimisation, technical due diligence and maintenance strategies.

### **Ensuring high-quality gas**

The import of gas from various origins and new gases are presenting companies with the question of how a safe interchangeability of these gases can be guaranteed. DNV KEMA gives a clear insight into the specifications that will affect integration into the gas network or the use in combustion plants, including green gases.

### **Accurate gas flow measurements**

Any deviation in the gas custody transfer affects the profitability of a business. For four decades, DNV KEMA has been involved in the design and operation of natural gas metering stations, including calibration in the flow laboratory to reduce systematic errors and guarantee accurate measurements.

### **Design, integrity and safety of gas infrastructure**

Gas infrastructure has to be designed carefully, and managed efficiently and safely. DNV KEMA provides international design expertise from mature gas markets. Furthermore, in order to monitor the integrity of the gas network over the years, inspection techniques are continu-

▼ DNV KEMA provides international design expertise for gas infrastructure.





ously evolving. DNV KEMA has the advanced tools companies need to manage their assets and carry out inspections.

Regulations on external safety are strongly influenced by a few major incidents. DNV KEMA specialists calculate the risks around pipelines and installations and are closely involved in legislation for safe gas transmission systems.

### ***Sustainable energy supply***

Gas has a role to play in a sustainable energy supply. DNV KEMA provides advice, performs research, carries out measurement programmes and enters into strategic collaboration where the focus is on new gases, CO<sub>2</sub> transport, smart grids and carbon footprint reduction.

### ***Developing markets and regulations***

Governments, regulatory institutions and the industry are faced with the need to design and implement new industry structures, competitive energy markets and appropriate regulatory concepts. DNV KEMA is involved in all aspects of industry and market design, including general industry structure determination and implementation of gas markets and access arrangements.

*For more information visit [www.dnvkema.com](http://www.dnvkema.com).*

### **OMV Gas & Power**

OMV, headquartered in Vienna, is one of Austria's largest listed industrial companies. The company was founded in Austria in 1956 and is now active in more than 30 countries worldwide. As an international and integrated oil and gas company with around 29,800 employees, OMV focuses on profitable growth in its three business areas of:

- ◆ Exploration & Production;
- ◆ Gas & Power; and
- ◆ Refining & Marketing including petrochemicals.

OMV runs a network of more than 4,500 filling stations under the brand names OMV,



Avanti, Petrom and Petrol Ofisi and operates four refineries.

### ***The bridge to Europe's energy supply***

As an international and integrated oil and gas company, OMV focuses on its strengths and is present in the regions that will play a key role in ensuring Europe's energy supply: the Middle East and the Caspian Region, where more than 50% of global oil and gas reserves are stored. The stage will also be set here for the European energy system of the future. Turkey will play an important role as a strategic bridge to these regions rich in raw materials. By investing in Turkey, OMV has created the basis for a secure and sustainable supply of oil and gas to Austria and Europe.

### ***Gas & Power***

OMV is an important component of Europe's gas network and a central gas hub for Europe. OMV Gas & Power ensures the supply of natural

▶ Vienna-headquartered OMV is one of Austria's largest listed industrial companies.

# Power to Gas for a smooth energy transition

An integrated approach toward the power and gas infrastructure enables an affordable and realistic transition to a sustainable and reliable energy system. Conversion of power to gas can offer maximum flexibility to the power system in cases that demand and supply do not match and surpluses to be accommodated.

DNV KEMA Energy & Sustainability acknowledges the value of the gas infrastructure to facilitate flexibility and seasonal storage.

Advantages of converting power to gas:

- Flexibility in electricity accommodation
- Seasonal storage of renewable energy to balance demand and supply
- Direct storage in large quantities in Europe's extended and robust gas infrastructure with a cycle time from days to months
- Cost-effective energy transport over long distances

[www.dnvkema.com](http://www.dnvkema.com)





▲ The Baumgarten compressor station is an important distribution hub for Europe.

▼ Wintershall is Germany's largest crude oil and natural gas producer. The company's interests include ZAO Achimgaz, a joint venture with Gazprom producing from the Urengoy gas field in West Siberia.

gas to its customers. In total, OMV marketed some 101.37 bcm of capacity via its 2,000-km gas pipeline in Austria in 2011. The Baumgarten compressor station is an important distribution hub for Europe and transfers around a third of Russian gas exports to Western Europe. In 2011, Gas & Power sold around 24 bcm of gas. The Central European Gas Hub is one of the most important trading platforms for natural gas in Continental Europe and recorded a trading volume of 40 bcm in 2011. OMV will

further expand its position within the gas value chain. As part of this effort, gas-fired power plants will become a new and attractive outlet for gas from its own production facilities. New gas locations will also be developed through the E&P portfolio. Nabucco remains a key project for OMV and will secure Europe's supply for the long term. The objective of the Nabucco pipeline is to transport gas from the Caspian region via a new route to Europe.

OMV Gas & Power became a member of IGU because the Union offers a platform for natural gas companies along the whole gas value chain worldwide to develop a stronger position for natural gas in the future energy mix.

Speaking with one voice the gas companies will better shape the energy sector, developing high standards in production, transportation, storage, sales, trading and new technologies to better serve the customer's real needs.

*For more information visit [www.omv.com](http://www.omv.com).*

### Wintershall

Wintershall Holding GmbH, based in Kassel, Germany, is a wholly-owned subsidiary of BASF in Ludwigshafen. The company has been active in the exploration and production of crude oil and natural gas for over 80 years.

Wintershall focuses on selected core regions, where the company has built up a high level of regional and technological expertise. These are Europe, North Africa, South America, as well as Russia and the Caspian Sea region. In addition, these operations are complemented by the company's growing exploration activities in the Arabian Gulf.

Today, the company employs more than 2,000 staff worldwide from 35 nations and is now Germany's largest crude oil and natural gas producer. With the natural gas trading and transport subsidiaries it operates together with Russia's Gazprom, the BASF subsidiary is also an important gas supplier to the German and European market.





In this context, the International Gas Union provides the perfect framework to exchange views of the market developments and all future aspects which are relevant for the energy business of Wintershall.

*For more information visit [www.wintershall.com](http://www.wintershall.com).*

### Woodside

Woodside is the largest operator of oil and gas production in Australia. We are also Australia's largest independent dedicated oil and gas company.

Throughout our 58-year history we have strived for excellence in our safety and environment performance and we aim to ensure that wherever we operate, the community benefits from our presence.

Woodside produces around 800,000 barrels of oil equivalent each day from an extensive portfolio of facilities which we operate on behalf of some of the world's major oil and gas companies.

Our operated facilities include six liquefied natural gas trains, five offshore platforms (one under construction) and four oil floating production storage and off-loading (FPSO) vessels.

We are the most active exploration company in the deepwater provinces of Australia, having participated in around 40% of Australia's deepwater exploration wells.

We have been operating our landmark Australian project, the North West Shelf, for 28 years and it remains one of the world's premier LNG facilities.

The natural gas we produce and market helps meet the demand for cleaner energy from our customers in Australia, Japan, China, Republic of Korea and other countries in the Asia-Pacific region.

In 2012, Woodside began production from Pluto LNG in Western Australia. At full capacity it will add more than 100,000 barrels of oil equivalent a day to our operated production.

We are seeking to expand the Pluto facilities and build new standalone projects including Browse LNG in Western Australia's Kimberley region and Sunrise LNG off the northern coast of Australia.

Through the depth of our experience, the capability of our people, and our strong relationships with customers, co-venturers, governments and communities, we seek to be the partner of choice.

Woodside is pleased to join IGU members in promoting gas as an integral part of a sustainable global energy system and supporting the political, economic and technical progress of the gas industry.

*For more information visit [www.woodside.com.au](http://www.woodside.com.au).*

▼ Pluto LNG shipped its first cargo in May 2012. The plant has a capacity of 4.3 mtpa.



# Publications and Documents Available from IGU

As a non-commercial organisation promoting technical and economic progress in the gas industry worldwide, IGU offers its publications free of charge.

You are invited to download the publications currently available from the IGU website [www.igu.org](http://www.igu.org) or to order hard copies from the Secretariat.

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## IGU publications

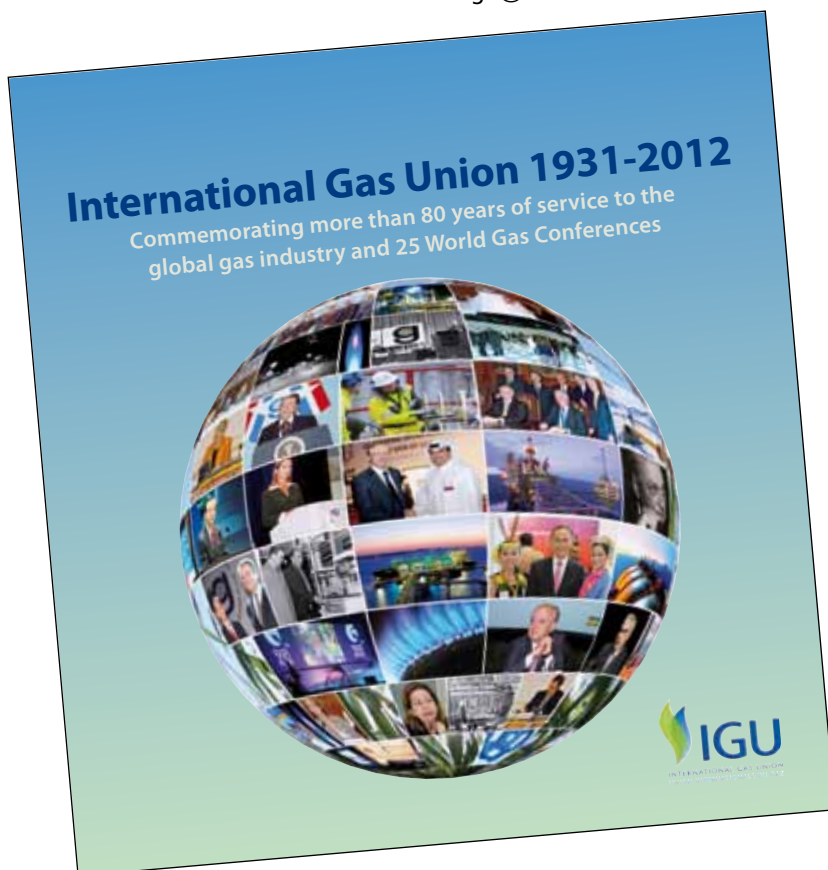
- ◆ IGU Articles of Association
- ◆ IGU Annual Report
- ◆ IGU Strategic Statement
- ◆ IGU General Brochure
- ◆ IGU Organisation Chart
- ◆ Triennial Work Programme 2012-2015
- ◆ IGU Gas Efficiency Award 2008/2009 & IGU Social Gas Award
- ◆ IGU Guiding Principles for Sustainable Development
- ◆ Natural Gas – Part of the Solution to Global Climate Change
- ◆ Natural Gas as a Transportation Fuel
- ◆ Natural Gas Unlocking the Low-Carbon Future
- ◆ World LNG Report 2010
- ◆ Wholesale Gas Price Formation – A Global Review of Drivers and Regional Trends

## Reports for WGC2012

- ◆ Best Practices and IGU Awards
- ◆ Building Strategic Human Capital
- ◆ Everything You Wanted to Know about Gas ... but Were Afraid to Ask (Youth publication)
- ◆ Geopolitics and Natural Gas
- ◆ Natural Gas Industry Study to 2030: An Update on Supply, Demand and Trade
- ◆ Nurturing the Future Generations for the Oil and Gas Industry
- ◆ Reduction of Greenhouse Gases: A Technology Guide
- ◆ Renewable Gas: The Sustainable Energy Solution

## Special IGU publications for WGC2012

- ◆ Global Vision for Gas: The Pathway towards a Sustainable Energy Future
- ◆ IGU Natural Gas Conversion Guide



- ◆ IGU Natural Gas Conversion Pocketbook
- ◆ International Gas Union 1931-2012
- ◆ Shale Gas: The Facts about the Environmental Concerns
- ◆ World LNG Report – 2011

#### Publications from WGC2009

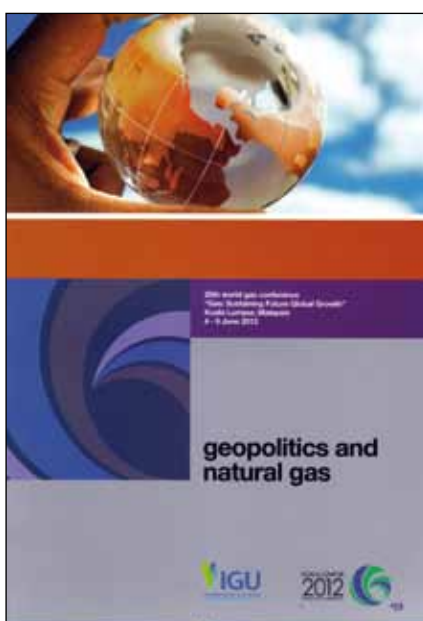
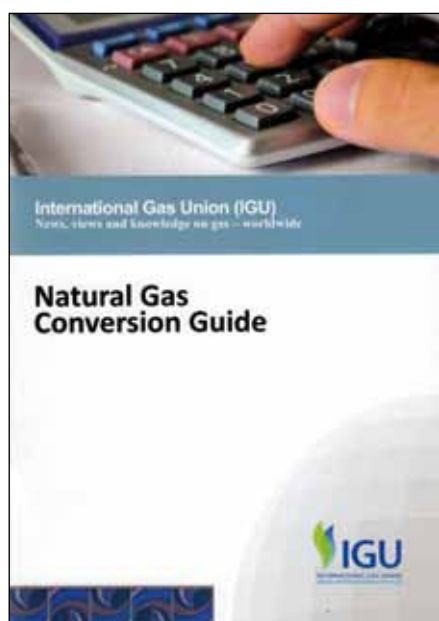
- ◆ Natural Gas Industry Study to 2030
- ◆ IGU Energy Efficiency Indicators
- ◆ IGU Proposed Guidelines for Gas Market Integration
- ◆ Best Practices Initiative
- ◆ Proceedings of the 24th World Gas Conference, Buenos Aires 2009

#### Joint publications with other organisations

- ◆ The Role of Natural Gas in a Sustainable Energy Market (with Eurogas)
- ◆ Guidebook to Gas Interchangeability and Gas Quality 2011 (with BP)

#### Scientific and technical papers and documentation

- ◆ Proceedings of the 23rd World Gas Conference, Amsterdam 2006, (CD-ROM)



- ◆ Sustainable Development and the Role of Gas (2006)
  - ◆ Gas to Power Global Outlook, (2006)
  - ◆ The Art of Regulation, (2006)
  - ◆ Proceedings of the 22nd World Gas Conference, Tokyo 2003
  - ◆ Proceedings of the 17th, 18th 19th, 20th and 21st World Gas Conferences, (CD-ROM)
  - ◆ International Gas, ISC, all issues of the bi-annual IGU Magazine from 2004
- Please check the IGU website for other (older) publications which are still available from the IGU Secretariat.



# IGU Events and Other Major Gas-related Events 2012-2013

<b>2012</b> October 8-11 Gastech 2012 Conference & Exhibition London, UK	November 6-10 13th NGV Global Biennial Conference & Exhibition (NGV2012) Mexico City	<b>2013</b> <b>April 9-11</b> <b>IGU Executive Committee</b> <b>Seville, Spain</b>
October 9-11 GASEX 2012 Conference & Exhibition Bali, Indonesia	<b>November 16</b> <b>3rd IEF-IGU Ministerial Gas Forum</b> <b>Paris, France</b>	April 16-19 LNG 17 Houston, USA
<b>October 16-19</b> <b>IGU Council Meeting</b> <b>Ottawa, Canada</b>	November 26-December 7 18th Session of the Conference of the Parties to the UNFCCC (COP 18)	October 13-17 22nd World Energy Congress Daegu, Korea
November 6-8 Global Unconventional Gas 2012 Beijing, China	Doha, Qatar	<b>October 22-25</b> <b>IGU Council Meeting</b> <b>Beijing, China</b>

## Acknowledgements

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Cover: Melkøya LNG plant in Norway (Øyvind Hagen/Statoil), Fos-Cavaou LNG receiving terminal on France's Mediterranean coast (Cyril Becquart/GDF SUEZ), Kuala Lumpur International Music & Light Festival (WGC2012) and Aguada Pichana tight gas field in Argentina (Total Austral/Florian von der Fecht – Photodesign).

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News from the Secretariat: All IGU except Shradha Bhatnagar/Weber Shandwick (34), Informa Energy (36, lower right).

Malaysia Hosts the June Council Meeting: WGC2012.

IGU Awards and Best Practices for the 2009-2012 Triennium: WGC2012.

News from Organisations Affiliated to IGU: EDI (51 & 52), GIE (54 & 56), Royal Dutch Shell (60), GTI (61 & 62), NGV Global (65), Clean Energy Fuels (66 upper), WGC2012 (66 lower).

Houston Prepares for LNG 17: LNG 17 (68), Gary A. Barchfeld (69 upper), LNG 16 (69 lower), Cheniere Energy (70).

The 25th World Gas Conference: WGC2012.

The Gas World Meets in Kuala Lumpur: WGC2012.

Post-Conference Reports from the Committees and Task Forces: WGC2012.

The Strategic Guidelines for the French Triennium: French Presidency of IGU.

The Triennial Work Programme: French Presidency of IGU (161), WGC2012 (162).

IGU's Global Vision for Gas: IGU.

The Discussion about Unconventional Gas: IGU (172 & 173), Carrizo Oil and Gas Inc. (174), John Borowski/Schlumberger (175).

IPIECA and Partnerships for Sustainable Development: IPIECA (178 upper & 180 lower), Shutterstock (178 lower & 180 upper), Petrobras (179).

New Rules for FLNG Ensure Safe Operations: National Gas Archive, National Grid (182), Samsung Heavy Industries (183).

Prospects for the Gas Industry in Cyprus: Tassos Roussos/Enfoton Solar Ltd (186), Adrian Giddings/ISC (187).

Presenting IGU's New Associate Members: APPEA (188), DNV KEMA (189), OMV (190 & 192 upper), Wintershall (192 lower), Woodside Energy Ltd (193).

# The Chairman of Brass LNG's Message for 2012



Dr Jackson E Gaius-Obaseki

The Brass LNG project is progressing at a sustainable momentum, moving it closer to realisation. During the past year giant steps were taken, notable amongst which are the following:

- The bids for the major engineering and procurement contracts (EPC) were received, have been opened and are currently being evaluated;
- Success was achieved in reducing the project's estimated capital expenditure;
- Tenderers have been technically qualified for some of the essential EPC support contracts including helicopter services, project security services and environmental monitoring services;
- Reserves certification has been received for all three gas suppliers and all gas supply options stand in good stead. The negotiation of the gas supply agreement with gas suppliers will commence soon;
- The LNG sales negotiation process has been closed and recent efforts at improving the marketing portfolio have yielded positive results;
- Negotiations with marketing joint ventures, who are affiliated with the Nigerian National Petroleum Corporation as LNG buyers are at a final stage;
- No security threat has been reported over the Project's interest;

I am happy to report that phase 1 of the early engineering works has been completed and approval given to commence phase 2A. Phase 2B, which includes FEED verification, will be completed as scheduled. During this phase, the key activity will be the award of contracts for the long lead equipment items that support the gas trains engineering and procurement (GTEP) schedule. Negotiations on the GTEP contract have reached an advanced stage with notable progress. EPC activities are going well and on schedule.

Recently, shipping activities were put on hold and the validity of shipping acquisition tenders with ship yards and owners and operators will be extended to the end of this year. It is expected that the shipping acquisition process will resume in the coming months of 2012.

## Working with our stakeholders

Brass LNG Ltd continues to work with the Nigerian Content Development and Monitoring Board (NCDMB) on critical Nigerian content issues as they affect Brass LNG. In a bid towards advancing EPC activities, NCDMB has always cooperated with Brass LNG and given approvals where necessary. Brass LNG is committed to contributing to capacity building in the country. The company will continue its interactions with government agencies as well as engaging with all stakeholders in a transparent manner.

I am happy that by the end of the first quarter of 2012, management presented their overall integrated master schedule and estimated that with full commitment and unwavering efforts by all, the final investment decision (FID) is possible within the first quarter of 2013.

ConocoPhillips plans to divest from Nigeria and, in effect, from Brass LNG Limited. However, they have confirmed their commitment to the company and have recently approved a budget that would lead the project to FID.

We would like to thank the former Group Managing Director of the Nigerian National Petroleum Corporation, Mr Austin Oniwon, for his unusual commitment towards the realisation of the Brass LNG project and welcome his successor, Mr Andrew Yakubu.

This report would be incomplete without any mention of appreciation for our stakeholders. I must thank especially the President of the Federal Republic of Nigeria for recent approvals he has given that have facilitated the project's onward momentum, the Minister of Petroleum Resources, the Governor of Bayelsa State, the Host Communities and all Stakeholders for their commitment. We stand steadfast in the knowledge that this is a choice project, valued by all and contributing to Nigeria's aspirations for economic growth. I must also thank the board, management and staff of Brass LNG for their unrivalled dedication, inspiration and enduring efforts towards the success of the project.

**Dr. Jackson Gaius-Obaseki, CON,**  
**Chairman of the Board of Directors,**  
**Brass LNG Ltd.**



# PTT Group Harnessing The Limitless Power of Synergy

We believe that by working together as a group, our potential for success is limitless. PTT Group, the complete energy conglomerate, manages the business of energy from its source all the way through to end-use, realizing a multitude of benefits along the way. From exceptional business responsiveness to outstanding continued revenue growth, all our companies work hand-in-hand to proudly achieve our highest potential on the world stage. **At PTT Group, we believe in the power of synergy.**



Power for Sustainable Future

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Energy Converting  
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## PTT

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Energy Company

## PTTGC

The World – Leading  
Chemical Innovator

