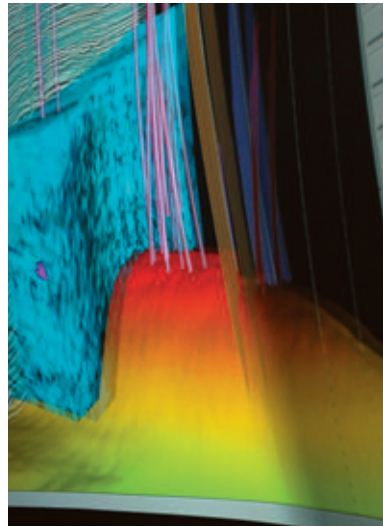
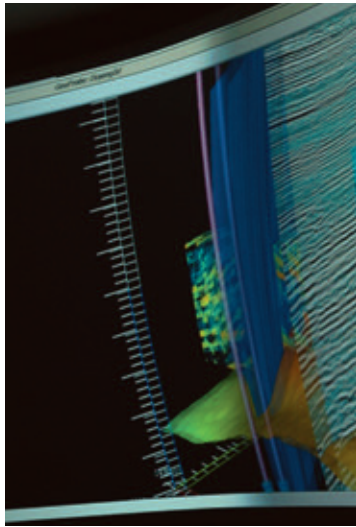


International Gas OCTOBER 2006
INTERNATIONAL GAS UNION



www.igu.org





PETRONAS is Malaysia's very own integrated petroleum multinational corporation. Ranked among the Fortune Global 500 largest corporations in the world, the PETRONAS Group has over 30 years of solid experience in oil, gas and petrochemical operations, with presence in more than 30 countries.

Over the years, we have developed distinctive strengths in our gas business, making PETRONAS a trusted partner and reliable supplier of choice. Our proven capabilities in fully integrated liquefied natural gas (LNG) and gas processing & transmission pipeline network operations are among our greatest strengths. Leveraging on our ability to ensure security of supply from our large gas reserves and the synergy of connectivity throughout the whole value chain of our gas business, we are able to meet our customers' needs with a high level of reliability and flexibility.



Host of the 25th World Gas Conference & Exhibition Kuala Lumpur 2012

L I F E . P O W E R E D B Y G A S

PETRONAS

An Integrated Global Gas Player

Established on 17 August 1974 as the national oil company (NOC) of Malaysia, PETRONAS always strives to maintain the trust and confidence of our stakeholders to ensure sustainable development. With gas constituting about 75% of Malaysia's reserves and as an important source of clean and efficient energy for powering growth, it has become a key focus business area for PETRONAS. We are hence committed towards the sustainable development of the global gas industry through strategic alliances and continuous research and technological development efforts.

Our gas business activities cover the entire gas value chain from exploration and production of natural gas to gas processing and liquefaction, transmission pipeline operations, marketing and trading, LNG shipping, gas district cooling and supply of industrial utilities.

With our international upstream portfolio of 59 ventures in 26 countries, our exploration and production (E&P) operations are driven by our continuous focus on technology and human capital development, in line with our aspiration to be a leading global E&P player and a leader in niche technology development and application in geoscience. Towards this end, we have joined the league of other petroleum companies to leverage on state-of-the-art immersive visualisation technology for the interpretation and evaluation of upstream data. Our global upstream activities have

created for PETRONAS a strong and growing reserve base of about 25.5 billion barrels of oil equivalent, of which close to 15 percent are international reserves.

The abundant supply of natural gas from our upstream operations has allowed PETRONAS to diversify into downstream gas liquefaction activities. The venture into the LNG business commenced in 1983. Through joint ventures, we have successfully developed the world's largest LNG production facility at a single location. The PETRONAS LNG Complex in Bintulu, Sarawak in East Malaysia comprises eight LNG trains in three plants with a combined capacity of 23 million tonnes per annum. This fully integrated complex currently supplies some 15 percent of the global LNG requirements, mainly in the Far East markets of Japan, Korea and Taiwan. It has delivered more than 4,000 timely and uninterrupted LNG cargoes to date.

Backed by this strong experience and sound track record, we have now expanded beyond our traditional markets into the Atlantic Basin with our acquisition of equity interest in Egyptian LNG (ELNG), Pars LNG in Iran and Dragon LNG in the United Kingdom. The development of the ELNG plant in Idku, Egypt has set a world record as the world's fastest developed LNG project which was completed within six years from the first exploration well to the lifting of the first LNG cargo. The ELNG plant receives its feedstock from our upstream operations in the offshore West Delta Deep Marine Concession, in which PETRONAS is a 50:50 equity partner. Our interest in Dragon LNG, our joint venture company undertaking the construction of an LNG receiving and regasification terminal in Milford Haven, Wales in the United Kingdom completes our involvement in the entire gas value chain of a fully integrated LNG operation.

In the more than 20 years of our LNG operations, we have maintained an unblemished record as a trusted and reliable LNG supplier, strongly supported by our shipping subsidiary MISC Berhad. MISC Berhad, the world's largest single owner-



operator of specially designed LNG fleet capable of loading and discharging its cargoes at almost all terminals globally, has made more than 4,000 safe and timely LNG deliveries since its first shipment in 1983 to customers in Japan, Korea, Taiwan and the Atlantic Basin.

In addition to LNG, PETRONAS also has the full capability to design, build, operate and maintain gas processing and transmission pipeline infrastructure of world standards. To monetise Malaysia's abundant gas reserves, PETRONAS spearheaded the implementation of the multi-phase Peninsular Gas Utilisation (PGU) project which began in 1984 and was completed in 1997. Comprising more than 2,500 km trans-peninsular gas transmission pipeline network and six gas processing plants, the PGU system today forms the backbone of Peninsular Malaysia's gas supply infrastructure and has substantially aided Malaysia's industrialisation process, especially the development of the gas-based petrochemical industry. The system is now linked to the Trans Thailand-Malaysia Gas Pipeline in the north to transport gas from the Malaysia-Thailand Joint Development Area, and to the power plants in Singapore in the south. It represents a critical building block of the Trans-ASEAN Gas Pipeline system, a project headed by PETRONAS under the auspices of the ASEAN Council on Petroleum (ASCOPE), which is expected to further enhance the region's security of gas supply. Overseas, PETRONAS also has interests in gas transmission pipeline business in Australia, Argentina and Indonesia.

In our efforts to further diversify gas utilisation, we have developed and implemented a Natural Gas for Vehicles (NGV) programme since 1986 to promote the use of gas in the transportation sector. This has led to the establishment of 39 NGV dispensing facilities to date, located at selected PETRONAS service stations in high traffic density areas. Plans are underway to increase this number to 90 by 2010.

PETRONAS has also introduced the gas district cooling (GDC) system in Malaysia, using natural



gas as an energy source to produce chilled water for air conditioning together with co-generation in an integrated energy system. The GDC system is currently in use at the Kuala Lumpur City Centre, PETRONAS Twin Towers, the Kuala Lumpur International Airport and the Government complex in Putrajaya.

PETRONAS' research and technical facilities, which also houses the ASCOPE Gas Centre, undertakes testing and research & development (R&D) activities to support the expanding gas business. We also undertake joint techno-economic studies and participate in exchange programmes for technologists and researchers as part of our commitment towards developing local and regional technological know-how.

Malaysian Gas Association (MGA)

The Malaysian Gas Association (MGA), established in 1986, aspires to create synergy in realising and harnessing the potential of the gas industry by driving the increased utilisation of gas through research and development initiatives, while promoting its usage domestically and internationally. Committed to making meaningful contributions to the gas industry, PETRONAS holds the MGA presidency. With a membership of 126 corporate organisations, MGA actively participates in worldwide gas activities under the auspices of the International Gas Union.

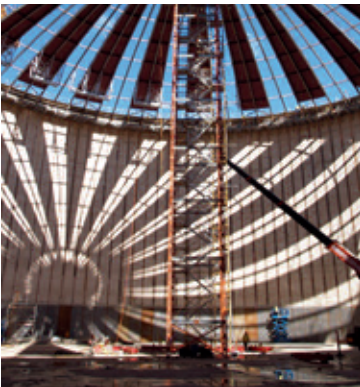
MGA and PETRONAS will be hosting the 25th World Gas Conference in 2012.



4GAS

Dedicated to LNG

4Gas is the new name for a company that has been active and successful in LNG since 1998 within Petroplus and is now an independent company. 4Gas is financially strong with the Carlyle & Riverstone Groups as major investors. Our mission is to develop, build, own and operate LNG terminals worldwide. We developed Dragon LNG in Wales which will enter service in 2007. 4Gas has received the Environmental Permit for LionGas in Rotterdam and is currently permitting the proposed LNG terminal in Goldboro, Nova Scotia. 4Gas is dedicated to LNG. www.4gas.biz



4Gas developed Dragon LNG in Wales which will enter service in 2007.



4Gas has received the Environmental Permit for its LionGas, Rotterdam terminal



Sable Gas Plant, adjacent to LNG site, Goldboro, Nova Scotia.



Site location of LionGas, Rotterdam.

International Gas OCTOBER 2006

The IGU Magazine

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Vision, Mission and Objectives

The International Gas Union (IGU) is a worldwide, 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.

● The Vision

Recognising that natural gas has an important part to play in satisfying the global need for an environment-friendly energy source, IGU will be the most influential, effective and independent non-profit organisation, while serving as the spokesman for the gas industry worldwide.

● The Mission

IGU will actively, directly and through its members, promote the technical and economic progress of the global gas industry.

IGU will work towards improving the competitiveness of gas in the world energy markets. By promoting the development and application of new technologies and best practices, IGU will help optimise the economics of the entire gas chain, while emphasising sound environmental performance, safety and reliability.

IGU – serving as a global information clearing house – will promote transfer of technology and know-how.

In carrying out this mission, IGU will maximise value to its members and gas customers.

● 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, policy makers 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.

The Source for Reliable and Economical Gas Liquefaction Technology is a Name You Know...

ConocoPhillips Optimized CascadeSM Process

The ConocoPhillips Optimized CascadeSM Process for natural gas liquefaction has proven to be reliable and economical in operations at Kenai, Alaska and Atlantic LNG, in Point Fortin, Trinidad. ConocoPhillips' gas liquefaction technology provides exceptional operating flexibility which has set the standard for LNG plants around the world.

New facilities at Atlantic LNG; Egyptian LNG in Idku, Egypt; Darwin LNG in Darwin, Australia; and EG LNG in Equatorial Guinea are building on a legacy of project and plant performance that was first established nearly 40 years ago.

To learn more about how the Optimized CascadeSM Process can provide the LNG plant performance you require, please visit our Web site <http://lnglicensing.conocophillips.com> or call 1-281-293-4LNG.


ConocoPhillips
Liquefied Natural Gas
Optimized CascadeSM Process 

conocophillips.com



Kenai LNG

Atlantic LNG

Egyptian LNG

Darwin LNG

Equatorial Guinea LNG





Big thinking.

When you take on some of the most technically challenging projects in the world, you have to think big and you have to think innovatively. At Hydro we have more than 100 years'

experience of challenging assignments. This has made us one of the world's most competent companies in the development of global oil and gas resources.

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<i>By Ernesto López Anadón and Roberto Brandt</i>			

The opinions and views expressed by the authors in this magazine are not necessarily those of IGU, its members or the publisher. While every care has been taken in the preparation of this magazine, they are not responsible for the authors’ opinions or for any inaccuracies in the articles.

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



Yemen: A New Energy for the Future

At the start of a new millennium, Yemen relies on natural resources for much of its income to provide for over 20 million inhabitants. From economic growth to social development, the continued expansion and promotion of the oil and gas industry are essential for achieving the ambitious reform programmes undertaken by the Government since the reunification of Yemen in 1990.

A lynchpin of the government's development policy, Yemen LNG Company (YLNG) is a new step in the development of Yemen's natural resources. With an investment of 3.7 billion dollars and annual production and export of 6.7 million tons of liquefied natural gas, YLNG becomes the largest industrial project ever undertaken in the country, thereby providing the financial catalyst for future economic growth and modernization.

Yemen LNG Key Figures

Gas Supply	Block 18 (Marib), Yemen
Sales Gas Reserves	9.15 TCF proven, 0.7 TCF probable
Plant Location	Balhaf, Yemen (200 km SW of Mukalla, 320 km from fields)
Number of Trains	2
Technology	APCI C3/MCR
Total Capacity	6.7 Mtpa guaranteed capacity
Sales Contracts	3 long term contracts to Suez, Kogas and Total Gas & Power for a total of 6.7 Mtpa
Terminal	Balhaf (dedicated)
Jetty Dimension	70,000 - 205,000 m ³ ships
Storage Tank Capacity	2 x 140,000 m ³
First Delivery	End 2008

Shareholders

	TOTAL YEMEN LNG COMPANY LTD. 39.62 %
	YEMEN GAS COMPANY (YGC) 16.73 %
	YEMEN HUNT LNG COMPANY, LLC 17.22 %
	SK CORPORATION 9.55 %
	KOREA GAS CORPORATION 6.00 %
	HYUNDAI CORPORATION 5.88 %
	GENERAL AUTHORITY FOR SOCIAL SECURITY AND PENSIONS 5.00 %

YLNG is committed to building a world-class company based on the principles of safety, operational excellence and business integrity as well as environmental stewardship and corporate social responsibility. The company is also committed to building a national workforce that meets international standards and to forging strong partnerships with local communities, in accordance with shareholders' and stakeholders' expectations. With the government as a major shareholder, YLNG becomes a key public-private venture, promoting industrial expansion, encouraging further foreign investment, and providing real opportunities for Yemeni citizens.

Yemen LNG Company Ltd.





Message from the President

Dear Colleagues

This is the first time I have the pleasure to address you directly through our publication, as President of IGU.

My responsibility today is further enhanced by the high standard imposed by our Dutch predecessors during the Triennium which has just concluded, where key and sensitive issues were boldly addressed, researched and analysed. The results of these works were exhibited during the very successful 23rd World Gas Conference held in Amsterdam.

As with all professional studies conducted in depth, the answers derived from the insights provided were coupled with a new set of questions, signifying clearly the need of a consistent strategic approach when considering the role of our industry during these times of permanent change. This is the driver behind our leading phrase for our Triennium: *The Global Energy Challenge: Reviewing the Strategies for Natural Gas*.

On the completion of IGU's 75 years, we find it fitting to set our sights on the end of our Union's first century of existence, to concentrate our strategic prospective analysis until the year 2030. This period was mainly considered convenient, however, because it includes a timeframe where planned systems for energy expansions will be considered and conducted, and where IGU's policy recommendations should be developed to prepare for the major energy-domination shifts which are likely to occur in the long term. You will find we provide further detail about the extent of this study in this issue of the Magazine.

One of our challenges for the next Triennium will be to balance this analysis with the market

and operational considerations of the nearer term, with a strong emphasis on the ever growing concern of security of supply. The Working and Programme Committees as well as the Task Forces, will face the major challenge of addressing this issue, from gas field to burner tip, both through pipeline or LNG, and from the intertwining standpoints of supply capabilities, safety and sustainability including the environment.

This issue also includes two articles on regional market considerations: the first part of a report on South America, and a report on Russia and Ukraine. Each of these cases possesses unique characteristics and implications, but they display the same need for analysis from the perspective of regional gas market integration, which we envisage as one of the drivers for economic and social development. In line with IGU's vision of being the most influential and effective non-profit organisation of the gas industry, we have defined this theme as one of our Strategic Guidelines. Throughout the Triennium, we intend to develop meaningful insights on how to enhance and encourage this integration which involves both corporate and government players, addressing policy, regulation, market infrastructure and financing issues.

Indeed we are facing a new set of questions, but we are convinced that with the support and talent provided from IGU's membership, we will successfully engage them in depth during this new Triennium.

I close this one-sided dialogue at this point, looking forward to the exchange I hope these opening words will induce, with each one of you, in the near future.

Ernesto López Anadón



Ernesto López Anadón, President.



Message from the Secretary General

Dear Reader

● **A glorious event!**

This is how many participants described the 23rd World Gas Conference and Exhibition, which took place in Amsterdam, The Netherlands, June 5-9.

The World Gas Conferences are the biggest events of the Union and this was the culmination of a hectic and very rewarding Triennium under the Dutch Presidency, to whom I pay tribute for having made IGU more visible and proactive.

Inevitably this issue will focus on the World Gas Conference in Amsterdam, where practically all important people from the global gas industry convened. You will find articles and pictures from the week in Amsterdam as well as the final reports from the Dutch Presidency.

In IGU a World Gas Conference marks the end of one Triennium and the beginning of the next. As you will see elsewhere in this issue of the Magazine, the IGU Council elected Ernesto A. López Anadón from Argentina as President of IGU for the Triennium 2006-2009, and you will find interviews with him and the new Chairman of the IGU Coordination Committee, Mr Roberto D. Brandt. It is the first time in the 75-year history of IGU that a country from the Southern Hemisphere has taken charge of the Union.

Together, we have worked hard in the first part of this year to prepare the new Triennium. Chairs, Vice-Chairs and Secretaries of the IGU Committees have been elected and instructed, and Members are now nominating participants to these Committees. Indeed, the first meetings have already taken place. A set of Strategic Guidelines and a new Triennial Work Programme describing 27 key topics have been



Peter K. Storm, Secretary General.

prepared for final approval by the Council, meeting in October in Lima, Peru.

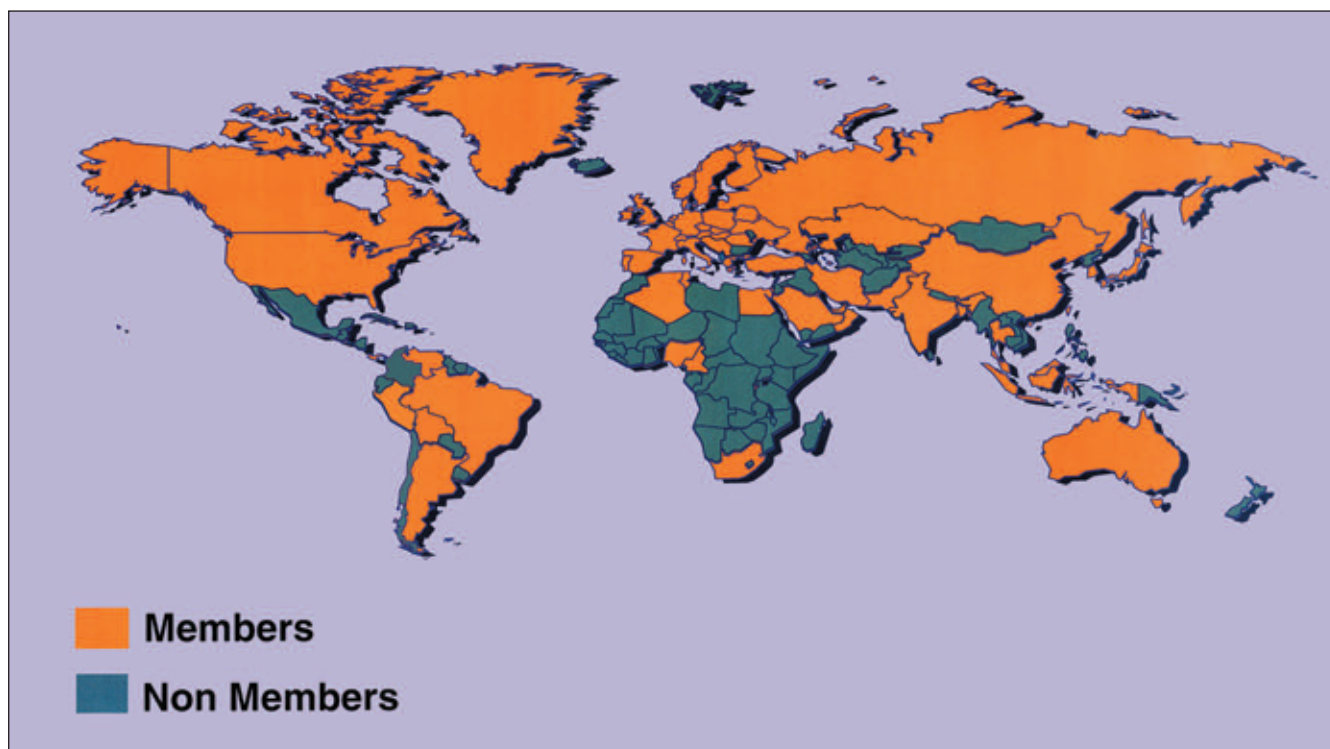
So, basically what this issue of the IGU Magazine is all about is rejoicing over the splendid results from Amsterdam and describing all the hard work ahead of us towards the 24th World Gas Conference and Exhibition in October 2009 in Buenos Aires, Argentina.

Enjoy your reading.

Peter K. Storm

Countries Represented in IGU October 2006

Algeria	Egypt	Latvia	Singapore
Argentina	Estonia	Lithuania	Slovak Republic
Australia	Finland	Malaysia	Slovenia
Austria	France	Monaco	South Africa
Bangladesh	Germany	Netherlands, The	Spain
Belarus, Republic of	Greece	Nigeria	Sweden
Belgium	Hong Kong, China	Norway	Switzerland
Bolivia	Hungary	Oman, Sultanate of	Taiwan, China
Bosnia and Herzegovina	India	Pakistan	Thailand
Brazil	Indonesia	Peru	Trinidad and Tobago
Brunei	Iran	Poland	Tunisia
Cameroon	Ireland	Portugal	Turkey
Canada	Israel	Qatar	Ukraine
China, People's Republic of	Italy	Romania	United Arab Emirates
Croatia	Japan	Russia, Federation of	United Kingdom
Czech Republic	Kazakhstan	Saudi Arabia	United States of America
Denmark	Korea, Republic of	Serbia and Montenegro	Venezuela





CHARTER MEMBERS

<i>Algeria</i> Association Algérienne de l'Industrie du Gaz – AIG	<i>Czech Republic</i> Czech Gas Association	<i>Italy</i> Comitato Italiano Gas (CIG)
<i>Argentina</i> Instituto Argentino del Petróleo y del Gas	<i>Denmark</i> Dansk Gas Forening – Danish Gas Association	<i>Japan</i> The Japan Gas Association
<i>Australia</i> Australian Gas Industry Trust c/o Energy Networks Association	<i>Egypt</i> Egyptian Gas Association	<i>Kazakhstan</i> KazTransGas
<i>Austria</i> Österreichische Vereinigung für das Gas- und Wasserfach (ÖVGW)	<i>Estonia</i> Estonian Gas Association	<i>Korea, Republic of</i> Korea Gas Union
<i>Bangladesh</i> Petrobangla (Bangladesh Oil, Gas & Mineral Corporation)	<i>Eurogas</i>	<i>Latvia</i> Latvijas Gāze
<i>Belarus, Republic of</i> Beltransgas	<i>Finland</i> The Finnish Natural Gas Association	<i>Lithuania</i> Lithuanian Gas Association
<i>Belgium</i> Association Royale des Gaziers Belges	<i>France</i> Association Française du Gaz (AFG)	<i>Malaysia</i> Malaysian Gas Association c/o Petronas
<i>Bolivia</i> Cámara Boliviana de Hidrocarburos	<i>Germany</i> Deutsche Vereinigung des Gas- und Wasserfaches e.V. (DVGW)	<i>Monaco</i> Société Monégasque de l'Électricité et du Gaz (SMEG)
<i>Bosnia and Herzegovina</i> Gas Association of Bosnia and Herzegovina	<i>Greece</i> Public Gas Corporation of Greece (DEPA) S.A.	<i>Netherlands, The</i> Koninklijke Vereniging van Gasfabrikanten in Nederland (KVGN)
<i>Brazil</i> Associação Brasileira das Empresas Distribuidoras de Gás Canalizado (ABEGAS)	<i>Hong Kong, China</i> The Hong Kong & China Gas Co. Ltd	<i>Nigeria</i> Nigerian Gas Association c/o Nigeria LNG Ltd
<i>Brunei</i> Brunei LNG Sendirian Berhad	<i>Hungary</i> Association of Gas Distribution Companies	<i>Norway</i> Norwegian Petroleum Society (NPF) – Norwegian Gas Association
<i>Cameroon</i> Société Nationale des Hydrocarbures	<i>India</i> Gas Authority of India Ltd (GAIL)	<i>Oman, Sultanate of</i> Oman LNG L.L.C.
<i>Canada</i> Canadian Gas Association	<i>Indonesia</i> Indonesian Gas Association (IGA)	<i>Pakistan</i> Petroleum Institute of Pakistan
<i>China, People's Republic of</i> China City Gas Society	<i>Iran</i> National Iranian Gas Company (NIGC)	<i>Peru</i> Perúpetro S.A.
<i>Croatia</i> Croatian Gas Association c/o INA Naftalin	<i>Ireland</i> Irish Gas Association – Bord Gais Eireann	<i>Poland</i> Polskie Zrzeszenie Inżynierów i Techników Sanitarnych (PZITS) – Polish Gas Association
	<i>Israel</i> The Israel Institute of Petroleum & Energy	<i>Portugal</i> GDP – Gás de Portugal, SGPS, S.A.

CHARTER MEMBERS (CONTINUED)

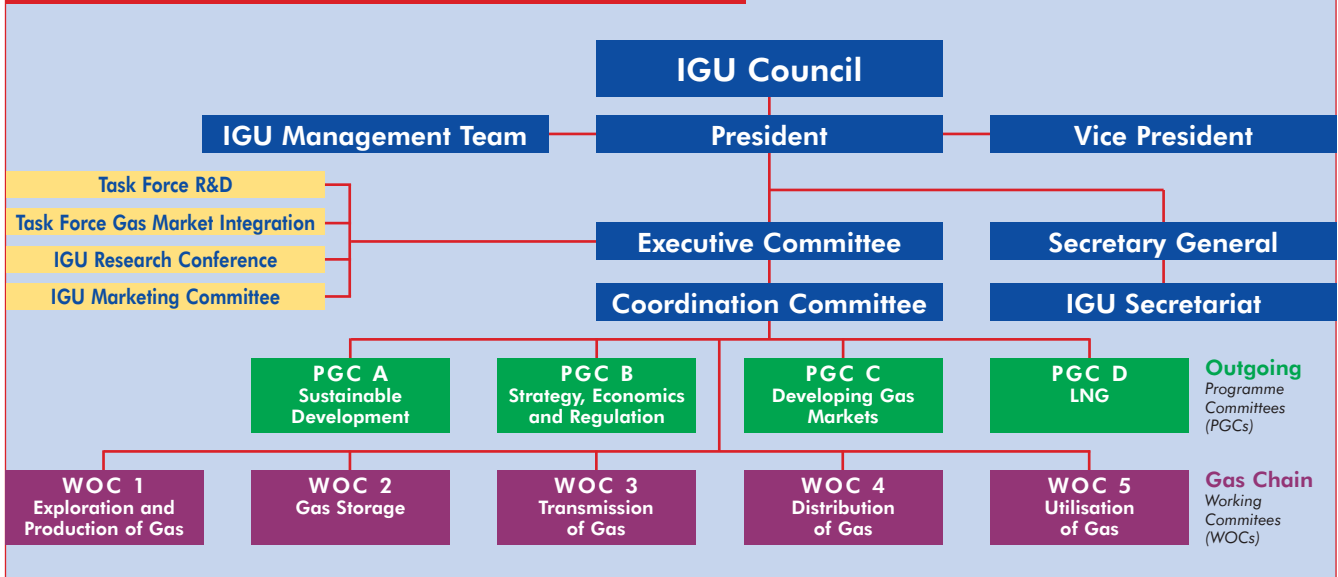
<i>Qatar</i> Qatar Liquefied Gas Company Ltd (Qatargas)	<i>Spain</i> Spanish Gas Association – Asociación Española del Gas (SEDIGAS)	<i>Tunisia</i> Association Tunisienne du Pétrole et du Gaz (ATPG) c/o ETAP
<i>Russia, Federation of</i> JSC Gazprom	<i>Sweden</i> Svenska Gasföreningen – Swedish Gas Association	<i>Turkey</i> BOTAŞ
<i>Saudi Arabia</i> Saudi Aramco	<i>Switzerland</i> Société Suisse de l'Industrie du Gaz et des Eaux	<i>Ukraine</i> Naftogaz of Ukraine NJSC
<i>Serbia and Montenegro</i> Gas Association of Serbia & Montenegro	<i>Taiwan, China</i> The Gas Association of the Republic of China, Taipei	<i>United Arab Emirates</i> Abu Dhabi Liquefaction Company Ltd (ADGAS)
<i>Singapore</i> Power Gas Ltd	<i>Thailand</i> PTT Public Company Ltd – Petroleum Authority of Thailand	<i>United Kingdom</i> The Institution of Gas Engineers and Managers
<i>Slovak Republic</i> Slovak Gas & Oil Association	<i>Trinidad and Tobago</i> The National Gas Company of Trinidad and Tobago Ltd	<i>United States of America</i> American Gas Association
<i>Slovenia</i> Geoplin		<i>Venezuela</i> Petróleos de Venezuela S.A. (PDVSA)
<i>South Africa</i> CEF Ltd		

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IGDAŞ – Istanbul Gas Distribution Co. (Turkey)	Suez S.A. (Belgium)
Indian Oil Corporation Ltd (India)	TBG – Transportadora Brasileira Gasoduto Bolívia-Brasil S/A (Brazil)
Instituto Brasileiro Petróleo e Gás (Brazil)	TOTAL S.A. (France)
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Natargas Fyn A/S (Denmark)	Union of Independent Gas Producers (Russia)
NV Nederlandse Gasunie (The Netherlands)	



IGU Organisation



The IGU Secretariat is currently hosted by the Danish company DONG Energy in its offices in Hørsholm outside Copenhagen.

IGU MANAGEMENT TEAM



Mr Ernesto López Anadón, IGU President (Chairman) (Argentina)



Datuk Abdul Rahim Haji Hashim, IGU Vice President (Malaysia)



Mr George H. B. Verberg, Immediate Past President (The Netherlands)



Mr Roberto D. Brandt, Chairman of IGU Coordination Committee (Argentina)



Mr Ho Sook Wah, Vice Chairman of IGU Coordination Committee (Malaysia)



Mr Peter K. Storm, Secretary General

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Algeria

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Mr Roberto Daniel Brandt
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Mr João Carlos França de
Luca
Instituto Brasileiro de
Petróleo e Gás, Associate Member

M. Yves Tournié
Total, Associate Member

Building Sustainable Asset Performance for Process Plant

By John van der Geer, Marketing Manager Industrial Automation Yokogawa Europe B. V.

The famed futurist Peter Drucker once commented that a well-managed process plant is “silent and boring”, where the role of the operator is transformed into that of a knowledge worker who spends more time optimising production rather than reacting to emergent problems in the plant. This article shows how a new concept developed by Yokogawa, known as VigilantPlant Asset Excellence, helps to achieve these aims by making their plant asset condition predictable and performance sustainable, thereby maximising asset availability and utilisation.

Asset Excellence is an extension of Yokogawa’s VigilantPlant™ concept, which aims to achieve operational excellence and create an environment where plant personnel can “See Clearly, Know in Advance, and Act with Agility”. The basis for Asset Excellence is the VigilantPlant Operational Excellence (OpX) model, which is comprised of three key initiatives that aim to achieve Production Excellence by driving forward operational agility and adaptability; bring Asset Excellence by ensuring asset availability and utilisation; and foster Safety Excellence through the protection of health, safety, and the environment (HSE). The common centrepiece of this model, Lifecycle Excellence, seeks to improve and sustain these three initiatives for long-term business success.

The Yokogawa approach to Asset Excellence combines four success factors that are essential for customers to get the most out of their plant assets over the long term: Asset Reliability, Asset Availability, Asset Predictability, and Asset Performance.

Asset Reliability is aimed at sustaining the daily use of plant assets for safe and agile production. This approach is typified by the Yokogawa CENTUM CS 3000 R3 control system, which uses reliable technology such as “pair and spare” CPUs and the Vnet/IP open and secure control network to maintain an unmatched 99.99999% availability track record. This is complemented by field devices which provide the system with stable and accurate process measurement under the severest of conditions.

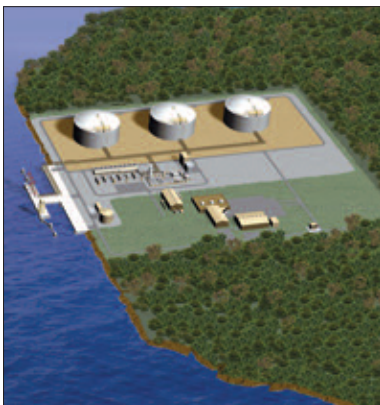
Asset Availability is achieved by securing maintainability to support the inherent reliability of Yokogawa products and systems. A key element here is the Yokogawa FieldMate™ Versatile Device Management Wizard: a new Field Device Tool (FDT) compliant PC-based integrated software tool that handles parameter setting for intelligent field devices, regardless of their make or field communication protocol. FieldMate speeds up device configuration and problem solving, and automatically stores a work log for a traceable field maintenance database which consolidates the maintenance work flow and facilitates the sharing of maintenance knowhow.

Asset Predictability relies on recent advances in online monitoring and predictive diagnosis technologies to optimise maintenance and maximise plant uptime. Yokogawa’s PRM™ Plant Resource Manager is an integrated asset management solution that enables centralised online monitoring of automation assets. In the latest PRM R3 version, a new PRM Advanced Diagnostics Application (PAA) environment will facilitate diagnostics application development, going beyond device health and device/process interface diagnostics. It also supports the FDT open standard, integrating diagnostics applications designed by device suppliers in the FDT Group.

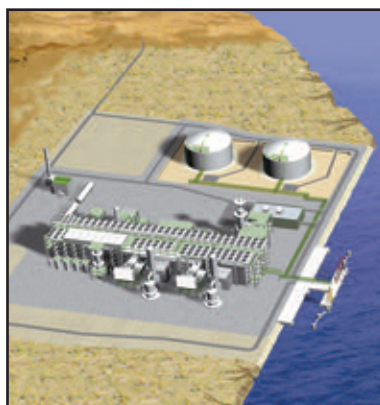
Asset Performance is more of a journey than a destination, demanding continuous performance improvement over the life cycle of a plant. Yokogawa’s InsightSuite™ AE Asset Excellence Services is a suite of consultancy, diagnosis, and optimisation services delivered over the plant life cycle to maximise Asset Performance.

► The bottom line

In process industries, customers need a compelling business value proposition to justify investment in any kind of automation. The concepts outlined in this article were created with this in mind, allowing plant managers to tap into Yokogawa’s wealth of diagnosis knowhow and use its performance improvement solutions to ensure continuous improvement and Asset Excellence over the plant life cycle.



58% of regasification plants are controlled by Yokogawa DCS (distributed control systems).



30% of liquefaction plants are controlled by Yokogawa DCS (distributed control systems).



38 LNG carriers worldwide are powered by Yokogawa.

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Making critical plant information fully visible is just the beginning of the vigilant cycle. Seeing clearly gives you the knowledge necessary to anticipate the changes required in your process. Knowing in advance brings you the speed and flexibility to optimize your plant in real time. And by acting with agility, you are able to adapt to the ups and downs of the LNG supply chain. VigilantPlant excels at bringing out the best in your plant and your people - keeping them fully aware, well informed, and ready to face the next challenge.

SEE CLEARLY

Improve visibility of information



DPharp EJX

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- Advanced diagnostics
- Standard model SIL2/3 transmitters

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"Uptime only" Production Control System



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- Securing uninterrupted natural gas supply
- Ultra reliability
- Keeping you informed of even remote plant

ProSafe-RS

- Avoidance of critical condition by single window operation
- TÜV certification
- Integration across Control and Safety



From the IGU Secretariat



Peter K. Storm, Secretary General.



Petter Nore, Deputy Secretary General.



Lotta Hållén-Kragh, Assistant to the Secretary General and Webmaster.

These pages feature news items and information from the Secretary General (PKS) and his Assistant (LHK). In this issue the Editor (MWB) has contributed a report, while comments and suggestions of general interest from Members or other organisations may also be displayed here. When submitting contributions to the Secretariat please ensure that any electronic pictures are supplied in a high resolution format – 300dpi is the minimum required for print reproduction.

● **IGU is still growing...**

A new country joined the IGU club in June, becoming the 68th to do so. Perúpetro S.A., a state-owned company, especially active in upstream activities in Peru, was accepted as Charter Member of Peru, when the Council convened in Amsterdam just before the beginning of the World Gas Conference. Perúpetro is hosting the next Council meeting in Lima in October 2006.

The Council also approved the accession of three new Associate Members: Cheniere Energy Inc. of Houston, USA, a focus on which appears on pages 180-181, Indian Oil Corporation Ltd from New Delhi, which has a rapidly growing natural gas portfolio in

India, and Izgaz – Izmit Gaz Dagitim San. Ve Tic A.Ş., a major gas distribution company in Turkey. A report from the Council meeting follows below.

● **...so are "Affiliations"...**

Gas Infrastructure Europe (GIE) and Pipeline Research Council International Inc. USA (PRCI) have become "Organisations Affiliated to IGU". The relationship means closer cooperation with IGU, participation in each other's meetings, possible out-sourcing of studies and the opportunity to have articles in the IGU magazine, as is the case for GIE in this issue (see pages 30–31).

● **...as well as the IGU Secretariat**

The Council, meeting last October in China, elected Norway to take over as host of the IGU Secretariat when my term as Secretary General ends in October 2007. Following this election the Council in Amsterdam elected Petter Nore, currently President of Norsk Hydro activities in Russia, as Deputy Secretary General with the view that he is elected the new IGU Secretary General when I stand down.

Lisbeth Koefoed, who has served as my Assistant since April 2000, has now moved on to another position in DONG Energy and our current Webmaster, Lotta Hållén-Kragh, is taking up the position as my Assistant. Meanwhile, Transgas/RWE has decided to take up the opportunity to station a young employee, Barbara Schmid, in the IGU Secretariat as part of an educational programme from September 1, 2006.

You will learn more about Petter Nore and Barbara Schmid in the next issue of this magazine.

PKS

● **Elections for representatives of Associate Members to the EXC**

In accordance with the Articles of Association the IGU Secretariat conducted an electronic voting procedure among the then 22 Associate Members of IGU in May. They had the possibility to elect three representatives to the Executive Committee

from their midst, and most of them used this opportunity. As a result BP Gas, Power & Renewables, Instituto Brasileiro Petróleo e Gás (IBP) and Total S.A. won the three seats.

BP will be represented by Ms Ieda Correia Gomes, Vice President New Ventures, South Asia, IPB by Mr João Carlos França de Luca, President of IBP and President of Repsol YPF in Brazil, and Total by M. Yves Tournié, Vice President, Technology. Yves Tournié was actually re-elected since he was also one of the Associate Member representatives during the Dutch Triennium.

PKS

● June Council meeting

With 2006 being a World Gas Conference year there are two Council meetings and the first was held immediately before the opening of the 23rd WGC in Amsterdam. The Honorary Presidents of IGU are always invited to join the top table at the Council meeting, and this time John Kean Sr (1985-88) Hans Jørgen Rasmusen (1994-97) Claude Detourné (1997-2000) and Hiroshi Urano (2000-2003) attended.

The Council's business centred on elections and the approval of new members and affiliated organisations. The elections fell into two parts: the formal anointing of IGU's new team for the 2006-

2009 Triennium and the choice for the six remaining seats on the Executive Committee.

Delegates approved Ernesto López Anadón as the new President, Datuk Abdul Rahim Hj Hashim as Vice President and, for the Coordination Committee, Roberto Brandt as Chairman, Ho Sook Wah as Vice Chairman and Andrés Kidd as Secretary. As regards the Secretariat, they approved Petter Nore as Deputy Secretary General. They also approved the new Management Team to include the first four plus George Verberg as Immediate Past President and Secretary General Peter Storm.

The members of the Management Team serve on the Executive Committee (Peter Storm as Secretary), which also includes representatives from each of the countries holding the chairmanship of the nine committees and three representatives of Associate Members. This leaves six seats to be decided by a free vote of Charter Members. Algeria, Austria, France, Korea, Italy and the USA were elected from a field of 10 and the full Executive Committee is shown on page 19.

Delegates went on to accept Peru as a new Charter Member, which will be represented by Perúpetro, and Cheniere Energy, Indian Oil Corporation Ltd and IZGaz as Associate Members. They approved a change in Charter Member Ukraine's representation with Naftogaz of Ukraine



The Council's business centred on elections and the approval of new members and affiliated organisations.



IGU DIPLOMAS AWARDED JUNE 4, 2006

Robert C. A. Doets, Chairman of the National Organising Committee (NOC) for WGC2006
Daniel Vlugt, Chairman of the Exhibition Committee for WGC2006

Rob Aptroot, outgoing CC Secretary
Lisbeth Koefoed, outgoing Assistant to the Secretary General
Henriëtte Schakel, NOC Assistant to the outgoing President

Dr Colin D. Lyle, Chairman WOC 1
Adam Hinds, Secretary WOC 1
Dr Sergei A. Khan, Chairman WOC 2
Elena Sushilina, Secretary WOC 2
Juan A. Díez de Ulzurrun, Chairman WOC 3
Gonzalo Castañeda Fernández, Secretary WOC 3
Peter A. Cistaro, Chairman WOC 4
Larry Ingels, Secretary WOC 4

Marc Florette, Chairman WOC 5
Alain Quinqueneau, Secretary WOC 5

Daniel Arias, Chairman PGC A
Patricia Yurgel, Secretary PGC A
Dr Klaus-Robert Kabelitz, Chairman PGC B
Uwe Klaas, Secretary PGC B
Camillo Michele Gloria, Chairman PGC C
Marco Gianninoto, Secretary PGC C
Dr Chawki Mohamed Rahal, Chairman PGC D
Mohammed Taleb, Secretary PGC D

Véronique Durand Charlot, Chairwoman of ICT Task Force

Dick de Jong, Chairman of the Special Project Gas to Power
René Snijder, Chairman of the Special Project Regulation
Ulco Vermeulen, Chairman of the Special Project Sustainability

NJSC taking over this responsibility from the Ukrainian Oil and Gas Academy. Delegates also welcomed Gas Infrastructure Europe and Pipeline Research Council International as affiliated organisations. IGU now has 68 Charter Members, 25 Associate Members and six affiliated organisations.

Other business included a presentation of the new Triennial Work Programme (see pages 139–154), approval of the 2005 accounts and a vote of thanks to Honorary Presidents John Kean Sr and Hiroshi Urano, who were standing down as members of the Executive Committee. Hiroshi Urano also stood down as Immediate Past President. The Council conferred the title of Honorary President on outgoing President George Verberg and granted Honorary Membership to Bert Panman, outgoing Chairman of the Coordination Committee. Finally, IGU Diplomas were awarded to those who had made outstanding contributions to the work of the 2003-2006 Triennium (see box).

MWB

● Join the IGU Committees

On several occasions I have encouraged all Members to nominate representatives to the nine IGU Committees. Many have already done so and several Committees will have had their first meeting in the course of September, but the Presidency and I would certainly like to see more representatives join.

We appreciate that in some cases nominations take time because on a national level a board meeting or similar has to approve them before they are sent. So, please consider again on which Committees you would be interested in having a representative to share your experience, to learn about the experience of others and to network with peers.

Active membership participating in the traditional bi-annual meetings of a Committee is preferable, but it is possible to have corresponding membership keeping up contact electronically and through the Committee portal on the IGU website. You can always contact the IGU Secretariat if you



ASIA'S EMERGING ENERGY HUB

Pakistan, an economically vibrant Asian country with rapidly growing domestic demand for energy is ideally located on the world's major Oil and Gas / LNG shipping routes. It is uniquely positioned to become Asia's Emerging Energy Hub and Corridor, linking the supply source countries of the Middle East and Central Asian Republics with high energy demand centres, such as India and China.

Natural gas currently meets over 50% of the energy needs of Pakistan which has the most well-developed transmission and distribution network in the region.

Sui Southern Gas Company Limited (SSGC) and its sister concern Sui Northern Gas Pipelines Limited (SNGPL) ensure safe, secure and uninterrupted supply of over 3bcfd piped natural

gas to more than 4.5 million domestic, 6000 industrial and 50,000 commercial customers in their respective franchise areas across Pakistan.

SSGC has launched the country's first 3.5mtpa LNG import project which is expected to be completed in 2010. Plans are in place for a second 3.5mtpa LNG Project to come on-stream two years later. Negotiations are also moving ahead on major transnational pipeline projects such as Iran-Pakistan-India (IPI) and Turkmenistan-Afghanistan-Pakistan-India (TAPI), which will together lay the foundation for Asia's new Energy Corridor.

To find out more about our Vision and plans, do visit the SSGC or Ministry of Petroleum & Natural Resources website or call SSGC on (+92 21) 902 1851 during office-hours, on any working day.



Sui Southern Gas Co. Ltd
www.ssgc.com.pk



Government of Pakistan
Ministry of Petroleum & Natural Resources
www.mpnr.gov.pk

have questions about any aspect of Committee membership.

● **New Task Forces**

The Argentine Presidency has decided to continue with a Task Force covering Research & Development, because it is a very important subject, where IGU has a mission to encourage Members and the gas industry at large to increase their R&D activities. Furthermore, in line with the new Strategic Guidelines a Task Force on Gas Market Integration has been organised. You can follow the work of these Task Forces in the progress reports, which will continue to be an integral part of this magazine.

PKS

Programme Committee are working to prepare the next Research Conference, and in February it was decided that this would take place in Paris in October 2008, hosted by the French Gas Association (AFG). It is planned that the best results from IGRC 2008 will be carried forward to the World Gas Conference in Buenos Aires one year later. IGRC will coordinate closely with the R&D Task Force.

IGM, Intergas Marketing, is also coming under the wings of IGU. This is being done in a gradual process which started by inviting all IGU Members to attend the 98th IGM Session in Budapest in September. IGM now stands for IGU Marketing Committee and you will hear more in coming issues.

PKS

● **IGRC and IGM**

As reported in earlier issues, IGU has undertaken to be the umbrella for what in the future will be called special IGU Activities/Committees.

IGRC now stands for IGU Research Conference. As before, a special Policy Committee and a

● **LNG-15**

Everybody in the gas industry is aware of the rapid development of the LNG sector. In fact, LNG is transforming the gas industry from a series of regional markets to a global market. This is just



LNG is transforming the gas industry from a series of regional markets to a global market.

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one of the reasons why you should consider attending the LNG-15 Conference and Exhibition, taking place in Barcelona, Spain, April 24-27, 2007. More details appear on pages 188–189. These LNG Conferences are organised every three years by a Steering Committee consisting of representatives from IGU, the US Gas Technology Institute (GTI) and the Paris-based International Institute of Refrigeration (IIR).

PKS

● The new IGU website – integrated on the net

During the last Triennium the IGU website and the Collaboration Portal, which facilitates document management and exchange, have been two separate, albeit linked, entities. To coincide with the “changing of the guard” and the advent of the new Triennium, a new combined site has been developed.

The main purpose of the re-launched www.igu.org is to provide more news, views and knowledge

on worldwide gas to Members and non-members. IGU wants to increase knowledge of the Union’s work and its position as an authority on natural gas.

IGU Members and Committees are encouraged to use the website as their common repository for knowledge and intelligence covering their special fields.

With this in mind, the new www.igu.org is built on a content management system (CMS), allowing non web-professionals to add and alter text and images without extensive knowledge of web programming tools.

Compared to the previous IGU website, this new and improved version offers much more knowledge and intelligence to all interested parties and encourages a closer dialogue with the IGU Management Team and Secretariat.

IGU encourages you to visit the site and try it out.

LHK



IGU’s new website is now live



National Hydrocarbons Corporation

Inviting you to invest in oil & gas exploration/production in Cameroon

P.O. Box: 955, Yaoundé, Cameroon
Tel: +237 220 98 64/+237 220 98 65
Fax: +237 220 46 51/+237 220 98 69
Website: www.snh.cm

Board Chairman: Jean-Marie ATANGANA MEBARA
Executive General Manager: Adolphe MOUDIKI
Exploration Manager: Jean-Jacques KOUM
Production Manager: Bernard BAYIHA

Industry background

- Cameroon's average oil production from 1 January to 31 March 2006: 89 943 barrels/day.
- Operators in production: Total E&P Cameroon, Pecten (an affiliate of Shell US), Perenco and ExxonMobil.
- Operators in exploration: ExxonMobil, Total E&P Cameroon, Sterling Cameroon Ltd, Turnberry, Euroil, Perenco Oil & Gas, ConocoPhillips, Pecten, Addax, Perenco Cameroon, Kosmos Energy LLC, RSM Production and Tullow Oil Plc.

The National Hydrocarbons Corporation (SNH), which works in association with the above-mentioned operators, markets the share of national crude oil production which accrues to the State.

The 1999 Petroleum Code and its implementation instruments together with the 2002 Gas Code, offer incentives to potential investors in the oil and gas sectors.

Cameroon: Development of Gas Resources

A stimulating legal and regulatory framework

Two attractive texts set applicable rules in the gas sector: law n° 2002/0313 of 30 December 2002 to institute a gas code, and decree n° 2003/2034/PM of 4 September 2003 defining modalities for the implementation of this law.

This code provides for:

- The concession regime for transport and distribution activities;
- The licence regime for processing, storage, importation and exportation activities;
- The authorisation regime for the sale of gas, importation and installation of equipment and materials intended for the commissioning of gas transport and distribution networks (gas storage centres, measuring and safety equipment to be used by operators and customers).

Moreover, it specifies the applicable accounting, financial, fiscal and customs provisions.

Substantial proven and potential reserves

With 157 billion m³ of proven natural gas reserves for an estimated unexploited potential of 570 billion m³, SNH is implementing several projects.

To foster the realisation of all the said projects, the Cameroon Gas Association was created on 26 October 2005, on the initiative of SNH.

Some interesting outlets

- Power generation
- A 150 MW capacity gas fired thermal plant at Kribi by 2008

A production sharing contract was signed on 7 March 2006 for the development and exploitation by operator Perenco, of the Sanaga Sud gas field, in the Douala/Kribi-Campo basin, with a view to supplying a gas-fired Thermal Plant due to be constructed near the town of Kribi.

Estimated reserves of the Sanaga Sud field: 1 062 BCF in the median case

Amount of initial investment upstream, gas fired turbines and 100km transmission line: about US\$200 million.

- Collection of associated gas, currently flared on platforms, to substitute heavy fuel oil at the Limbe thermal plant
- Exportation of natural gas

The first such project, which concerns exportation to Equatorial Guinea, is expected to be completed by 2009-2010.

- Supply of gas as energy source to industries
- Production and distribution of liquid petroleum gas (LPG)
- Methanol production



A rig in the Douala/Kribi-Campo basin: 18 wells were drilled in Cameroon between 2004 and 2005.



News from Organisations Affiliated to IGU

There are currently six organisations affiliated to IGU: the European Gas Research Group (GERG), Gas Infrastructure Europe (GIE), the International Association for Natural Gas Vehicles (IANGV) including its European section ENGVA, the International Gas Research Conference Foundation (which is separate to IGU's internal IGRC Committee), Marcogaz and Pipeline Research Council International (PRCI). In this issue we have a report from GIE, which became affiliated in June.

● GIE – Looking Forward to Cooperation with IGU

By Geert E. H. Joosten

Gas Infrastructure Europe represents the infrastructure operators in the field of natural gas in Europe and currently has 54 members in 28 European countries. GIE is the umbrella organisation for Gas Transmission Europe (GTE)

representing the transmission system operators, Gas Storage Europe (GSE) representing the storage system operators and Gas LNG Europe (GLE) representing the LNG terminal operators.

GIE aims at contributing to the achievement of the European internal gas market by expressing the views of the gas infrastructure operators to the European Commission, the European energy regulators (European Regulators Group for Electricity and Gas – ERGEG and the Council of European Energy Regulators – CEER), and the European Parliament.

● Main mission and objectives

The ambit and main objectives to be promoted or pursued by GIE are the development of the natural gas transmission, storage and LNG sectors in Europe and to promote cooperation among natural gas infrastructure operators. This work includes promoting a safe and reliable European natural gas transmission, storage and LNG system suitable for meeting present and future needs, and the development of a fully operational European internal gas market.

GIE represents the interests of its members in discussions with the European Commission, the regulators and other stakeholders. GIE aims to find market-based solutions in order to best meet the interests of the network users; with regards to regulated activities of our members we advocate a stable and predictable regulatory framework consistent throughout the European Union in order to create an environment that facilitates investments. This is of particular importance since infrastructure is a prerequisite both for security of supply and for creating competition. Only if investments in infrastructure and the creation of new capacity are sufficient in order to cope with the rising demand for natural gas, can natural gas remain a cornerstone of the European energy mix.

GIE is promoting interoperability of the European gas systems to enhance cross-border gas exchanges both through the work done within GIE



GIE has 54 members in 28 European countries.

on this issue and its involvement in EASEE-gas, the European Association for the Streamlining of Energy Exchange.

In order to achieve the above objectives and to actively participate in seeking and developing the most appropriate solutions, GIE is looking forward to cooperation with IGU. Furthermore, GIE is cooperating with other associations representing the different parts of the gas chain under commercial and technical aspects.

● Madrid Forum

With view to the specificities of the European Union, it should be mentioned that GIE is a key stakeholder in the European Gas Regulatory Forum of Madrid ("Madrid Forum"), which was set up in 1999 to discuss issues regarding the creation of a true internal gas market. Other participants are the national regulatory authorities, Member States of the European Union, the European Commission, gas suppliers and traders, consumers, network users and gas exchanges. The Forum convenes twice a year in Madrid.

The Forum currently addresses any potential technical and commercial barriers to the creation of a fully operational internal gas market such as third party access to the natural gas infrastructure. GIE has been contributing to these topics and the Madrid Forum is a good example of how integration of national markets can be pursued.

● IGU and GIE

GIE is proud to have become an organisation affiliated to IGU following the IGU Council meeting on June 5, 2006 under the outgoing Presidency of Mr George Verberg. GIE intends to contribute with its experience and knowledge to the Triennial Work



GIE is the umbrella organisation for GTE representing the transmission system operators, GSE representing the storage system operators and GLE representing the LNG terminal operators.

Programme for 2006-2009 under the new IGU President Mr Ernesto López Anadón.

In particular GIE will seek cooperation with Working Committee 2 – Storage, Working Committee 3 – Transmission, Programme Committee B – Strategy, Economics and Regulation and the Task Force on Gas Market Integration.

GIE believes that this cooperation will be to the mutual advantage of both organisations. In particular as regards regional gas market integration, GIE and its members, based on the experience with the European internal gas market, will be in a position to identify possible key factors that enable or favour regional energy and gas market integration throughout the world.

Geert E. H. Joosten is the President of GIE. For more information please visit www.gie.eu.com. Readers are also cordially invited to join the GIE Annual Conference 2007, which will take place November 22-23, 2007 in Madrid.



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