International Gas Union

TRIENNIAL WORK PROGRAMME 2009 - 2012

"Gas: Sustaining Future Global Growth"

25th World Gas Conference
Kuala Lumpur, MALAYSIA
4 - 8 June 2012

KUALA LUMPUR
2012
WORLD GAS CONFERENCE

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Note: *IGU – International Gas Union*

1 introduction

Wayang Kulit,
the traditional Malaysian art of shadow puppetry

Product lines from a gas processing plant located in the East Coast area of Malaysia

foreword
from the IGU President

The energy industry has witnessed rapid and dramatic changes in recent years, following huge swings in the global economic cycles. With the recent global economic and financial crisis weighing heavily on businesses, industries and the populace as a whole, the demand for energy has been in sharp decline, resulting in long-term impact on future investment growth, not only for the gas industry but also other key sectors of the economy.

Reflecting the global nature of the gas industry, the Presidency of the IGU shifts to Asia for the second time in its history. With more than half the world's human population, relatively low energy intensity and areas of potentially very high economic growth, there is a challenge for Asia which is of interest to the whole world. The Malaysian Presidency will continue to maintain the high standards of excellence of the predecessors to support the mission of IGU and in striving to achieve the vision of being "the most influential, effective and independent non-profit organisation, while serving as the spokesman for the gas industry world-wide". In this respect, IGU needs to continually reinvent itself to remain relevant to the industry and its members. Efforts to change the organisation and strategies have been initiated and some of these changes will be made during the Malaysian triennium.

Natural gas will continue to play a vital role in meeting the world's expanding energy needs while helping to cut greenhouse gas emissions, a persistent threat to global growth, life and environmental sustainability. Despite intense interests to accelerate the development of 'green energy' for the creation of low carbon economy, natural gas is expected to continue its dominance as the fuel of choice in the coming decades.

This is primarily driven by its premium as an abundant and clean source of energy that is being delivered to consumers via advanced technology and infrastructure fully supported by global expertise. Furthermore, constant innovation and technology breakthroughs have continued to enhance natural gas future sustainability from the economic, social, technical and environmental aspects that will significantly contribute towards the global economic growth.

Against this backdrop, the Malaysian IGU Presidency has set the theme **"Gas: Sustaining Future Global Growth"** as the foundation for the work during the 2009-2012 Triennium. The theme inherently portrays gas as the engine for global growth which has to be sustained in its availability through innovation, technology and competent human capital.

Despite the challenges brought about by the crises, we are confident that the IGU will be able to ride out the storm and turn them into opportunities and upsides for the benefit of the global community. Issues such as global warming and climate change, technology and innovation, geopolitics as well as talent sourcing and management for the gas industry will remain at the forefront. We are committed to promote a constructive intellectual discourse in addressing these issues, provide reference tools for decision makers, strengthen networking and relationship building and add value to all our members.

I am confident that with the full and continuous support from members of the IGU and its fraternity, the Malaysian Triennium will be able to steer the IGU towards greater heights and a promising future for the world.

Datuk (Dr) Abdul Rahim Hashim
President, IGU

foreword
from the IGU Coordination Committee Chairman

1. Introduction

The Malaysian triennium begins at a very challenging time when the world is experiencing an unprecedented financial and economic crisis which impacts the energy industry, including natural gas. Like oil, natural gas is experiencing demand contractions in all major consuming regions of North America, Europe and Asia stemming from the global economic downturn. The extreme price patterns contributed by demand destruction, make investment decisions difficult and undermine sustainable economic growth. It is uncertain how long and deep the recession will be but the natural gas industry is a long-term business and will remain as the fuel for a sustainable future.

2. The 2009 - 2012 Theme and Strategic Guidelines

Against this backdrop, the theme for the Malaysian Presidency is:

"Gas: Sustaining Future Global Growth".

Gas plays a vital role in meeting the world's expanding energy needs. As the world economy recovers and expands, the need for clean, efficient energy will continue to grow. In an increasingly carbon constrained world, as global warming translates into policy, gas has significant advantages over other fossil fuels. Gas remains as a key element in the fuel mix to drive future global growth and gas for power generation is by far the largest growth sector.

Growth needs to be sustainable. Global energy needs continue to make increasing demands on gas supply. Future growth of the industry must be sustainable which means taking account of the economic, environmental and social aspects, so that welfare can continue to improve throughout society. Sustainable growth aims to improve conditions in the present without compromising the ability of future generations to meet their own needs. This entails not only the enhanced availability of gas, through the development and implementation of gas technology but also the critical human resources needed to ensure that all the critical elements are operating at the optimum level throughout the value chain.

In support of the theme and to reinforce IGU's role in the gas industry, we have identified four strategic guidelines to sustain future global growth.

These are:

i. Enhance the role of gas for sustainable development and balancing the needs of all stakeholders

ii. Improve availability of gas and access to markets

iii. Maximise efficiency throughout the expanding gas value chain

iv. Ensure adequate human capacity to enable growth and integrity of the industry

These principles provide the framework upon which we have developed the technical programme and initiated special projects for the triennium.

3. Triennial Work Programme

The detailed work programme in this document provides the objectives and scope of all the studies and projects that will be undertaken during the course of the triennium. These activities will be executed by the Programme Committees, Working Committees and Task Forces, whose participants are drawn from the IGU membership. The programme has been put together through a process of highly constructive discussions with the outgoing committee authorities as well as through brainstorming sessions with the incoming committee authorities, subject matter experts and IGU management. The objective is to ensure continuity of the work done from the previous Argentine triennium coupled with the need to ensure currency and relevance of the studies to the strategic guidelines and current environment. We would like to acknowledge the support and contributions of the Argentine Presidency with whom we have always maintained a constructive engagement and whose inputs have been most valuable in ensuring a smooth transition between the triennia.

Two important concerns have emerged in developing our plans for the triennium. They are the human resource challenge and the influence of geopolitics in the evolution of the gas industry. We believe these areas will have serious implications on the future sustainability of the industry and therefore merit further consideration. We have therefore captured these concerns by initiating three special projects during the triennium to study the issues, impact and challenges. Another concern is climate change, the seriousness of which has captured the attention of policy makers, international organizations and NGOs the world over. While the world will continue to depend on fossil fuel for most of the energy needs in the foreseeable future, we believe natural gas has an important role to play in mitigating climate change. Therefore, the IGU Presidency and Secretariat, together with the Sustainability Committee (PGC A) will step up efforts in important forums such as the UNFCCC (COP) meetings to increase our visibility and promote the use of gas.

Likewise, in achieving our work programme, we will continue the collaborative efforts with other international organisations such as International Energy Agency (IEA), International Energy Forum (IEF), World Petroleum Council (WPC), World Energy Council (WEC) and other similar organisations.

4. Changes to the Organisation Structure

The basic structure of the Programme Committees (PGCs) and Working Committees (WOCs) has remained largely unchanged from the previous triennium. However, the scope of work of some of these committees have been streamlined and defined to ensure greater clarity. In addition, effective from the Malaysian triennium, a new Programme Committee (PGC E) has been introduced named “Marketing”. The formation of this committee provides formal recognition to the former Intergas Marketing (renamed IGU Gas Marketing or IGM) into the mainstream of IGU. The role of PGC E is to identify and develop ideas, tools and products for successful promotion and sale of natural gas.

After the successful organisation of the IGU Research Conference (IGRC) in Paris in October 2008 under the revised approach and new organisational structure, the successful formula will continue to be adopted in the current triennium.

5. Conclusion

No one is isolated from today’s global challenges. In times of great adversity and unprecedented challenges, there are also opportunities. IGU will use these opportunities to further promote the technical and economic progress of the gas industry.

Ho Sook Wah
Chairman, IGU Coordination Committee

foreword
from the IGU Secretary General

The International Gas Union (IGU) was founded in 1931 as a global, non-governmental and non-profit organisation registered in Switzerland. The Secretariat is currently located in Norway under the sponsorship of StatoilHydro.

Natural gas is expected to remain as an important component in the primary energy mix, serving as a key energy source for power generation and other industries as well as a feedstock for the petrochemical sector. Recognising the premium it commands as an environmental friendly source of energy and with the support of the whole membership, IGU will continue to promote the technical and economic progress of the global gas industry and position itself as the center of reference and a recognised spokesman on natural gas.

We are entering the Malaysian triennium at a time when the global economy and financial markets experience a turmoil and volatility which have not been seen since the Great Depression of the 1930s. The gas industry has to meet the many challenges resulting from the crisis. IGU will address the issues in several ways through study work, conferences, and seminars by creating meeting places within the IGU community and in cooperation with other institutions like the International Energy Agency, the International Energy Forum, United Nations and others.

The 2009-2012 Triennial Work Programme (TWP) for which you are now holding, is in that context an important document, because it is establishing the framework for the professional work of the Union in the coming three year period. I am confident that it will produce results which are of interest to and beneficial for its members and the gas industry in general. More than 700 industry leaders who are specialists from the IGU global membership participated in this work during the last triennium.

The Committees and Task Forces, as described in this TWP, are managed and coordinated by the Coordination Committee. The result of the work in the IGU Committees will be shared with members and presented at the World Gas Conference in Kuala Lumpur in 2012. In specific cases, the reports will be published in accordance with the IGU publication policy.

In the next pages, you will find a list of more than 100 Charter and Associate members, followed by a chart of the IGU organisation which shows you the structure of IGU and its management as well as an overview of the Working Committees, Programme Committees and Task Forces with their leaders.

The gas industry is exposed to a very dynamic and volatile business environment. The TWP has captured the key issues and will address the challenges facing our industry. These includes, in addition to the global economic downturn, mitigation of the climate change, security of supply and demand, globalisation of the gas markets, and securing the human resources that are required to ensure further progress of the gas industry.

I strongly encourage the IGU members to nominate representatives to the IGU Committees and Task Forces. They offer a unique opportunity for exchange of information, networking and sharing of competence across the gas industry.

Torstein Indrebø
Secretary General, IGU

The Forest Reserve Institute of Malaysia has a lush tropical rainforest in the heart of Kuala Lumpur

list of IGU Charter Members
(as of october 2010)

1. Algeria (Association Algérienne de l'Industrie du Gaz (AIG))
2. Angola (Sonangol Gás Natural (Sonagas))
3. Argentina (Instituto Argentino del Petróleo & del Gas)
4. Australia (Australian Gas Industry Trust c/o Energy Networks Association)
5. Austria (Österreichische Vereinigung für das Gas- und Wassersfach (ÖVGW)
6. Bangladesh (Petrobangla – Bangladesh Oil, Gas & Mineral Corporation)
7. Belarus, Republic of (Beltransgas)
8. Belgium (Association Royale des Gaziers Belges)
9. Bosnia and Herzegovina (Gas Association of Bosnia and Herzegovina)
10. Brazil (Associação Brasileira das Empresas Distribuidoras de Gás Canalizado (ABEGAS))
11. Brunei (Brunei Energy Association)
12. Bulgaria (Overgas Inc.)
13. Cameroon (Société Nationale des Hydrocarbures)
14. Canada (Canadian Gas Association)
15. China, People's Rep. of (China City Gas Society)
16. Croatia (Croatian Gas Association)
17. Czech Republic (Czech Gas Association)
18. Denmark (Dansk Gas Forening – Danish Gas Association)
19. Egypt (Egyptian Gas Association)
20. Equatorial Guinea (Sociedad Nacional de Gas G.E. (SONAGAS))
21. Estonia (Estonian Gas Association)
22. Eurogas
23. Finland (Finnish Gas Association)
24. France (Association Française du Gaz (AFG))
25. Germany, Fed. Rep. of (Deutsche Vereinigung des Gas- und Wasserfaces e.V. (DVGW))
26. Greece (Public Gas Corporation of Greece S.A. (DEPA))
27. Hong Kong, China (The Hong Kong & China Gas Co. Ltd.)
28. India (Gas Authority of India Ltd. (GAIL))
29. Indonesia (Indonesian Gas Association (IGA))
30. Iran (National Iranian Gas Company (NIGC))
31. Ireland (Irish Gas Association – Bord Gais Eireann)
32. Israel (The Israel Institute of Petroleum & Energy)
33. Italy (Comitato Italiano Gas (CIG))
34. Japan (The Japan Gas Association)
35. Kazakhstan (KazTransGas)
36. Korea, Rep. of (The Korea Gas Union)
37. Latvia (Latvijas Gaze)
38. Libya (National Oil Corporation of Libya)
39. Lithuania (Lithuanian Gas Association)
40. Macedonia (Macedonian Gas Association)
41. Malaysia (Malaysian Gas Association)
42. Mexico, Asociación Mexicana de Gas Natural, A.C.
43. Monaco (Société Monégasque de l'Électricité et du Gaz (SMEG))
44. Netherlands, The (Koninklijke Vereniging van Gasfabrikanten in Nederland (KVGN))
45. Nigeria (Nigerian Gas Association c/o Nigerian LNG Ltd.)
46. Norway (Norwegian Petroleum Society – Norwegian Gas Association)
47. Oman, Sultanate of (Oman LNG L.L.G.)
48. Pakistan (Petroleum Institute of Pakistan)
49. Peru (Perúpetro)
50. Poland (Polish Gas Association (PZITS))
51. Portugal (GDP – Gás de Portugal, SGPS, SA)
52. Qatar (Qatar Liquefied Gas Company Ltd. (Qatargas))
53. Romania (S.N.G.N. Romgaz S.A.)
54. Russia, Fed. of (JSC Gazprom)
55. Saudi Arabia (Saudi Aramco – Development Department)
56. Serbia (Gas Association of Serbia)
57. Singapore (Power Gas Ltd.)
58. Slovak Republic (Slovak Gas and Oil Association)
59. Slovenia (GEOPLIN)
60. South Africa (CEF Ltd.)
61. Spain (Spanish Gas Association – Association Española del Gas (SEDIGAS))
62. Sweden (Svenska Gasföreningen – Swedish Gas Association)
63. Switzerland (SWISSGAS)
64. Taiwan, China (The Gas Association of the Republic of China, Taipei)
65. Thailand (PTT Public Company Ltd. – Petroleum Authority of Thailand)
66. Timor-Leste (The Secretariat of State for Natural Resources (Government of the Democratic Republic of Timor-Leste)
67. Trinidad and Tobago (The National Gas Company of Trinidad and Tobago Limited)
68. Tunisia (Association Tunisienne du Pétrole & du Gaz (ATPG) c/o ETAP)
69. Turkey (BOTAS)
70. Ukraine (Naftogaz of Ukraine)
71. United Arab Emirates (Abu Dhabi Liquefaction Company Ltd. (ADGAS)
72. United Kingdom (The Institution of Gas Engineers and Managers)
73. USA (American Gas Association)
74. Venezuela (Petróleos de Venezuela S.A. (PDVSA)
75. Vietnam (Vietnam Oil and Gas Company)

list of IGU
Associate Members
(as of october 2010)

1. Bayerngas GmbH (Germany)
2. BG Group plc (BG) (United Kingdom)
3. BP Gas, Power & Renewables (United Kingdom)
4. Bursagaz (Turkey)
5. Cheniere Energy, Inc. (USA)
6. Chevron Corp. (USA)
7. China National Petroleum Corporation – CNPC (P.R. of China)
8. ConocoPhillips Company (USA)
9. DanaGas (United Arab Emirates)
10. Det Norske Veritas (DNV) (Norway)
11. E.ON Ruhrgas AG (Germany)
12. ExxonMobil Gas & Power Marketing (USA)
13. Gaslink – Gas System Operator Ltd (Gaslink) (Ireland)
14. GasTerra (The Netherlands)
15. GAZBIR – Association of Natural Gas Distribution Companies of Turkey (Turkey)
16. GDF SUEZ (France)
17. IGDAS – Istanbul Gas Distribution Co. (Turkey)
18. Indian Oil Corporation (India)
19. Instituto Brasileiro de Petróleo, Gás eBiocumbustiveis (Brazil)
20. IZGAZ (Turkey)
21. Liander N.V. (The Netherlands)
22. NV Nederlandse Gasunie (The Netherlands)
23. Origin Energy Limited (Australia)
24. Petróleo Brasileiro S.A. – Petrobras (Brazil)
25. Russian Gas Society (Russia)
26. RWE Rheinland Westfalen Netz AG Germany)
27. Shell Gas & Power International B.V. (The Netherlands)
28. Sonorgás (Portugal)
29. Spetsneftegaz NPO JSC (Spetsneftegaz) (Russia)
30. Swiss Gas and Water Industry (Switzerland)
31. TAQA, Arab Company for Energy (Egypt)
32. TBG – Transportadora Brasileira Gasoduto Bolivia-Brasil S/A (Brazil)
33. Thyssengas GmbH (Germany)
34. TOTAL S.A. (France)
35. Unían Fenosa Gas (Spain)
36. Vopak LNG Holding BV (Vopak LNG) (The Netherlands)

List of IGU
Affiliated Organisation
(as of october 2010)

1. Energy Delta Institute (EDI)
2. European Gas Research Group (GERG – Groupe Europěen de Recherches Gazières)
3. Gas Infrastructure Europe (GIE)
4. Gas Technology Institute (GTI)
5. Groupe International des Importateurs de Gaz Naturel Liquěfiě (GIIGNL)
6. International Association of Natural Gas Vehicle (IANGV)
7. Foundation International Gas Union Research Conferences (IGRC)
8. International Pipeline & Offshore Contractors Association (IPLOCA)
9. Marcogaz
10. Pipeline Research Council International, Inc. (PRCI)
11. Russian National Gas Vehicle Association (NGVRUS)

IGU
organisation chart

IGU COUNCIL

President
Datuk (Dr) Abdul Rahim Hashim
Malaysia

Vice President
Mr Jérôme Ferrier
France

Immediate Past President
Mr Ernesto A. López Anandón
Argentina

Vice Chairman
Mr Georges Liens
France

Secretary
Ms Ungku Ainon Ungku Tahir
Malaysia

IGU MANAGEMENT TEAM

President, Vice President, Immediate Past President, CC Chairman, CC Vice Chairman, Secretary General

EXECUTIVE COMMITTEE

COORDINATION COMMITTEE

Chairman
Mr Ho Sook Wah
Malaysia

A

IGU SECRETARIAT

Secretary General
Mr Torstein Indrebø
Norway

Director
Mr Hans Riddervold

Senior Advisor / Web Master
Mr Erik Gonder

IGU RESEARCH CONFERENCE (IGRC)

WORK GROUP ON SUSTAINABLE DEVELOPMENT

A

PROGRAMME COMMITTEES

PGC A SUSTAINABILITY

Chair
Mr Juan Puertas
Spain

Vice Chair
Mr Satoshi Yoshida
Japan

PGC B STRATEGY

Chair
Dr Colin Lyle
United Kingdom

Vice Chair
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Algeria

PGC C GAS MARKETS

Chair
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De Toledo
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Vice Chair
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Korea

PGC D LNG

Chair
Mr Alaa Abu Jbara
Qatar

Vice Chair
Mr Dirk A Van Slooten
The Netherlands

PGC E MARKETING

Chair
Mr Marc Hall
Germany

Vice Chair
Mr Roland Mett
Spain

WORKING COMMITTEES

WOC 1 EXPLORATION & PRODUCTION

Chair
Dr Amine Mazouzi
Algeria

Vice Chair
Mr Armando Teruo
Hashimoto
Brazil

WOC 2 STORAGE

Chair
Ms Hélène Giouse
France

Vice Chair
Mr Ladislav Goryl
Slovak Republic

WOC 3 TRANSMISSION

Chair
Mr Eric Dam
The Netherlands

Vice Chair
Mr Jorge Bonetto
Argentina

WOC 4 DISTRIBUTION

Chair
Mr Alessandro
Soresina
Italy

Vice Chair
Mr Dietmar Spohn
Germany

WOC 5 UTILISATION

Chair
Mr Tatsuo Kume
Japan

Vice Chair
Mr Eugene Pronin
Russia

TASK FORCES

TF 1 BUILDING STRATEGIC HUMAN CAPITAL

Chair
Ms Ieda Gomes
United Kingdom

Vice Chair
Mr Rod Kenyon
United Kingdom

TF 2 NURTURING FUTURE GENERATIONS

Chair
Ms Soh Mey Lee
Malaysia

Vice Chair
Ms Agnès Grimont
France

TF 3 GEOPOLITICS OF NATURAL GAS

Chair
Mr Mel Ydreos
Canada

Vice Chair
Mr Geert Greving
The Netherlands

II 2009 - 2012
triennial work programme

The impressive skyline of PETRONAS Twin Towers

Putrajaya, Malaysia's central administrative capital

1

overview of the gas industry

The natural gas industry is a phenomenal success story and has grown to become vital to the global economy, providing over 20% of the world's energy needs. Along the whole delivery chain from exploration and production through to an increasing variety of market sectors, the gas industry now finds itself in a new and challenging global context.

Natural gas remains the largest growing fuel source for electricity generation, and links with the electricity markets are growing stronger in many parts of the world. Oil companies have expanded into the gas market, and power generators are increasingly adding natural gas to their portfolio too. Unbundling and re-bundling along different lines also leads to a change in the business structure and commercial shape of the gas industry which is responding with new approaches evolving throughout the gas chain.

The global recession, which started in 2008, has dampened energy demand and led to sharp declines in oil and gas prices. Along with this, there has also been a contraction of capital investments in new gas projects, deferments of some committed projects, cut-backs in manpower and other expenditures, all of which might have long term negative consequences in terms of security of supply and sustainability.

Natural gas, with its economic, efficiency and environmental advantages, relative abundance and expanding infrastructure, should play a vital role in meeting the world's expanding energy needs. The future growth of the gas market, however, cannot be taken for granted. The dynamics of the geopolitical and economic developments across the world pose both a challenge and a responsibility to enable natural gas to make the optimum contribution in the future global energy mix. In addition, a stronger case need to be made for natural gas, especially in the policy arena, if natural gas is to remain a key fuel in the energy mix. The industry must not assume that the inherent advantages of natural gas will automatically make it the solution of choice. The future of natural gas will depend not on economics alone, but more importantly on policy choices by governments and policy makers.

It is therefore crucial that IGU continues to play the role of the worldwide gas industry spokesman, through cooperation with governments, policy makers and international energy-related organisations, to build the next phase of natural gas expansion that will bring environmental and economic benefits to the global community.

2

introduction to the Triennial Work Programme (TWP)

This "Triennial Work Programme" (TWP) is the core document that defines the action plan that the IGU will carry out during the next three years. The objective is to support the Mission of the organisation, as we strive to reach the Vision of being "the most influential, effective and independent non-profit organisation, while serving as the spokesman for the gas industry world-wide".

The 2009 - 2012 TWP aims to promote progress, competitiveness and value in favour of the global society and gas industry sector, through the development and exchange of knowledge and information.

The Strategic Guidelines for 2009 - 2012, which are the cornerstone of this TWP are explained further in Section 4. These Strategic Guidelines were endorsed by the Management Team and Executive Committee of the IGU in Gyeongju, Korea in September 2008.

The official launch of the 2009 - 2012 TWP took place upon presentation to the Council on 5 October 2009 in Buenos Aires, following the approval by the Executive Committee on 4 June 2009 in London.

The workforce to implement this programme comprises the technical committees and study groups, whose description and scope of work is set out later in this document. Their fields of interest cover the entire gas chain, as well as all the major "horizontal issues" concerning the world gas industry.

The work is conducted through a global network of knowledgeable professionals representing the Charter and Associate members of IGU. The Committee members work in Study Groups to identify and collect the relevant information on their fields of expertise related to the topics chosen for the triennium. Participants share the information within their respective groups and together the Committee analyses the findings and prepares the deliverables for presentation at the World Gas Conference.

The IGU Presidency and Secretariat warmly invite all Charter and Associate members to nominate individuals from their ranks to join and support the work of the Committees. Each Committee Member chooses which of the Committee Study Group that he/she would like to participate in. Nominations of active participants (and alternates) who will be able to travel to attend at least one full Committee meeting and one Study Group meeting each year are preferred. Our experience is that the personal contact, group interaction and cultural/social experiences through active participation in IGU working meetings, is of significant added value for their companies. Not only is the international outlook of key staff developed through the IGU experience, but the increased knowledge and insight from sharing information with technical and commercial peers in other countries provides a unique opportunity for improved future decision making and enhanced business relationships.

3

the theme for 2009 - 2012

In line with the mission of the International Gas Union, the theme of the 2009 - 2012 Triennium leading up to the 25th World Gas Conference (WGC) to be held in Kuala Lumpur in June 2012 is:

"Gas: Sustaining Future Global Growth"

The rationale behind this theme is as follows: **Gas is a key element in the fuel mix** to drive forward economic growth throughout the world. The share of natural gas in the global fuel mix is increasing. Its availability, environmental qualities in the context of climate concerns, economic and efficiency advantages and its expanding infrastructure are some of the main reasons behind the importance of natural gas. Gas is the most efficient and least polluting of the fossil fuels, providing optimal solutions increasingly in combination with less reliable renewable energy sources for power generation, heating and cooling.

Sustainability is the major factor in ensuring that future global growth will be robust. The enhanced availability of gas, not least through the development and implementation of gas technology and resources throughout the gas chain from production to final end use, will have an influence on whether sustainable growth can be achieved. Sustainable growth aims to improve conditions in the present without compromising the ability of future generations to meet their own needs. Sustainability therefore relates to the continuity of economic, social, institutional and environmental aspects of human society, as well as the non-human environment.

The challenges are both immediate and long-term. The gas industry is a long-term business, with investments in major projects taking many years to reach payback. A constantly changing world creates not just economic and technical challenges but also political risks for investors in long-term international projects or downstream infrastructure that relies on remote upstream supplies. Natural gas is clearly seen as the fuel of choice, but the development in the global gas market have made perceptions less clear. Can gas regain its clear position as the fuel of choice? In several regions, natural gas is now a depleting resource and this encourages approaches that maximise value and strive for increased energy efficiency. The longer-term sustainability of the gas industry requires policy decisions in the short-term that encourage investment that would benefit the world for many generations to come.

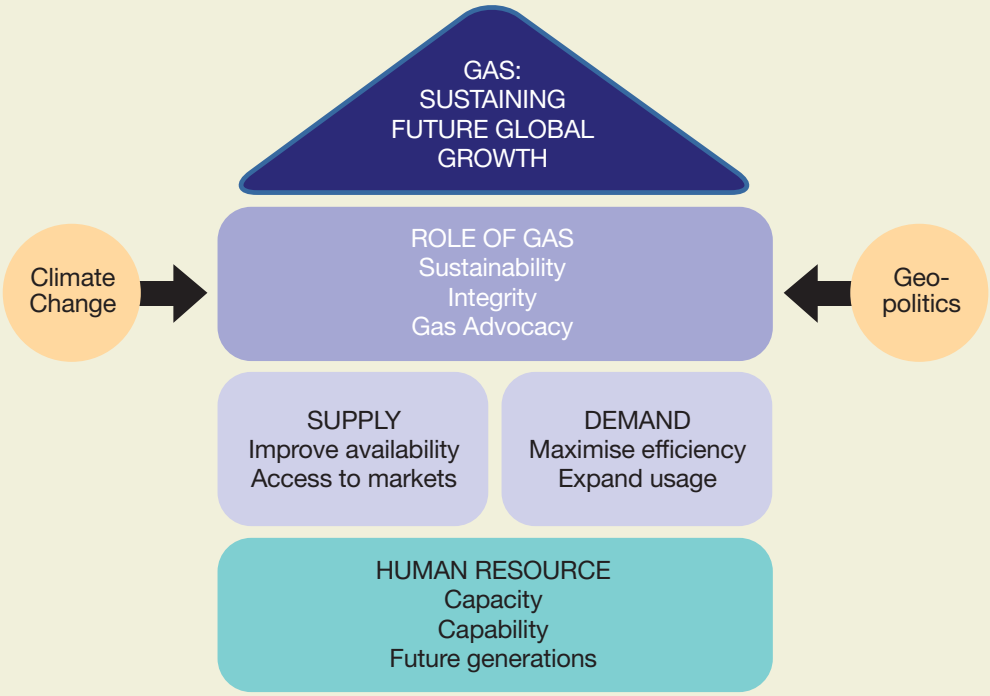
To fulfil the IGU mission, the 2009 - 2012 TWP aims to:

* Actively promote the technical and economic progress of the global gas industry
* Improve the competitiveness of gas in the world energy markets by promoting the development and application of new technologies and best practices, optimising the economics of the entire gas chain, while emphasising sound environmental performance, safety and reliability
* Serve as a global information clearing - house - promoting transfer of technology and know-how

IGU aims to maximise value to its members and to gas customers through the active participation of members in the 2009 - 2012 TWP, the professional support of the IGU Secretariat and the coordination of all technical activities by the Malaysian Presidency.

IGU will also make special efforts during the Malaysian Presidency to enhance partnership with industry and manufacturers and increase co-operation with Governments, policy makers and international energy related organisations particularly on regional and global issues.

4
the strategic guidelines



The above diagram illustrates the Strategic Framework of the Malaysian triennium. It summarises the Theme and Strategic Guidelines which forms the basis for the development of the Triennial Work Programme.

The four Strategic Guidelines are as follows:

1) **Enhance the role of gas** for sustainable development and balancing the needs of all stakeholders

2) **Improve availability of gas** and access to markets

3) **Maximise efficiency** throughout the expanding gas value chain

4) **Ensure adequate human capability** to enable growth and integrity of the industry

Promoting understanding and awareness of the problems and solutions in these four areas will provide decision makers, both inside and outside the industry, with a powerful foundation to take the actions that will help build and sustain regional and global growth.

These strategic guidelines are briefly explained below:

4.1 Enhancing the role of gas

Gas is in an increasingly complex and competitive global market in which there are regional differences in the fuel mix and the sectors that prefer the use of natural gas. Globally and locally there is a strong interplay with the cost/price, availability/ reliability and environmental impact of other primary fuels. In recent years, the industry has come under tremendous pressure as the perception of natural gas has shifted in the light of growing environmental concerns and the evolution of energy companies. In fact, the industry is at a cross road and there is a strong need for a coherent voice and a consistent message on natural gas as the industry establishes its role in the future in a carbon constrained world. IGU is in a strong position to be the advocate to enhance the role that natural gas plays to achieve widely sought objectives of enhanced security of energy supply, improved economic performance and in particular to mitigate the environmental impact of climate change. Although some answers may well have a different emphasis throughout the world, these regional issues need to be investigated and communicated clearly. But climate change is a

global issue. If there is to be an international agreement for a transition to a low-carbon world, natural gas will have to play the pivotal role, combining with investment in renewable energy sources to deliver economic and environmentally efficient solutions.

Recognising the importance of gas advocacy, the Malaysian Presidency has initiated the effort to improve IGU's advocacy for the gas industry, building on the key attributes and merits of natural gas and developing a communication strategy that will resonate with each stakeholder group.

4.2 Improving availability of gas

Availability of gas concerns both access to upstream supplies and access to downstream markets. During the first decade of the 21st century, we have seen an increased interest by many governments to take active control of the energy resources in their own country. This trend towards 'energy nationalism' among the oil and gas producing countries is in marked contrast to the trend of liberalisation of the downstream energy markets, particularly for electricity and gas. Whatever regime or market design is in place, for the gas industry to flourish, gas supplies need to be available from gas producers at the "right" price and customers need to be able to receive the necessary volumes of gas delivered to their homes and businesses when they need it.

The world has abundant natural gas resources, which could last well beyond this century. The currently proven recoverable natural gas reserves are, however, equivalent to only about 60 years of global production. Furthermore, not all these proven gas reserves are readily available, for example reserves might be theoretically economically recoverable but in environmentally hostile locations with no downstream markets that could accept large quantities of gas within thousands of kilometres. Conventional gas production in some parts of the world is now in decline but global gas production continues to increase. Gas is increasingly available from unconventional sources (like coal-bed methane and shale gas) or technology has moved the boundary of what can now be produced as a 'conventional' natural gas reservoir (tight sands or even source rocks). What other technical or political measures might be put in place to improve the economic availability of the large but remote gas resources that we believe exist on our planet?

Access to markets can be improved in many different ways, in particular through the development and application of new technology, via collaboration on major projects, through confidence in the right investment climate and by ensuring that the regulatory regime is appropriate. Reduced costs for gas transportation and improved access to downstream markets have an influence on the viability of upstream gas resources, just as reduced development and production costs that improve economic supply availability would stimulate downstream growth.

4.3 Maximising efficiency

This guideline encompasses two related topics:

a) How can the use of natural gas best be expanded?
b) How can we optimise the efficient use of gas throughout the value chain?

The components of the value chain vary, particularly in terms of the end-user markets. What are the prospects for developing or re-establishing certain market sectors in different countries or regions? What new uses will there be for gas, and where will they be applied given the differing climatic, socio-economic and other conditions in existing energy markets? The continuing expansion of gas sales in a world market that is increasingly environmentally conscious and cost sensitive requires the gas industry to leverage on technology and innovation and to target certain sectors for growth. Energy policy, regulation, gas pricing and risk management might have important influences on the success of any strategies for expanding downstream markets whether they are in NGVs, power generation, cooling systems or new industrial uses. Such an expansion of the gas sector portfolio also introduces new challenges and risks that will need to be identified and managed.

There is no doubt that the efficient use of natural gas is imperative for sustainable growth. The gas price can be an important lever as the price level impacts on gas demand, provides investment signals, encourages more efficient use and leads to innovation that reduces overall costs. In traded markets a gas price that is responsive to supply and demand enables risk management to be developed across the value chain and more innovative ways of coping efficiently with volatility.

Technical innovation and optimisation of efficiency is traditionally focused on gas utilisation and improvement in the performance of end-user appliances. As the gas industry strives for ever-improving efficiency, innovation and optimisation is increasingly applied throughout the gas chain. The challenge is to provide a growing customer-base with optimal volumes of gas, whilst lowering operating costs and at the same time maintaining and investing in plant and equipment.

4.4 Ensuring adequate human capability
In the middle of the first decade of the 21st century a technical skills shortage began to affect several engineering and energy industries. In the gas industry some countries already experienced acute problems with gaps in the expertise available in almost every part of the value chain. For the gas industry, in which safe operation is paramount, it is essential to ensure that trained personnel are available in a timely manner to sustain industry growth and to ensure the continued safe operations of plant and equipment.

The problem is being exacerbated both on the supply side, with ageing demographics leading to the retirement of many experts coupled with diminishing enrolment of students into technical/ engineering courses and on the demand side, with the growth in the gas market leading to increased requirements for trained staff for new projects. At the same time qualified personnel are required to ensure that the existing pipelines and equipment, which are continuously ageing, are maintained in a safe operational state.

As these factors come together it is increasingly complex to identify the specialised skills that will be needed, to ensure that such people are available when the industry needs them and that they can be retained with mutual benefits in the gas industry. What interactions are there with other industries? Should collaborative measures be put in place or will commercial solutions be possible? Is there an inter-governmental role to support technology training? What approach to human resources will be best to support sustainable growth?

The challenge is twofold. Firstly, to intensify skill development efforts to ensure that both the numbers and level of knowledge of staff will be sufficient for all parts of the future global gas industry. Secondly, to provide the foundations for longer-term prosperity and success by nurturing future generations towards science and technology careers in the energy industry and the world of gas in particular.

5
gas and climate change

There is an increasing demand for global solutions to global warming and the climate change effects that are linked to anthropomorphic 'greenhouse gas' emissions particularly carbon dioxide from fossil fuels. The clean image of natural gas is under threat, as it is increasingly linked in the media with oil or even coal. In fact natural gas is the cleanest fossil fuel, and provides the highest efficiency appliances. Natural gas can combine with less flexible and less reliable renewable energy to provide optimum solutions for power generation, heating and cooling. Natural gas has a key role to play in reducing road transport emissions, and in high efficiency distributed energy schemes. But all these benefits will not come about if the development of the gas industry is unduly constrained.

A larger and better-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_2, transmission pipelines can accept suitably processed biogases or in the future be used to transport hydrogen, distributed natural gas can be converted to hydrogen for use in fuel cells providing combined heat and power for efficient homes and business premises. These and other technology breakthroughs could provide economic solutions in the longer term, and allow the gas industry to prosper during the second half of the 21st century in a carbon- constrained world.

A special Work Group for Sustainable Development focused on the role of gas in mitigating climate change will be set up during the Malaysian triennium. This group which is chaired by the Secretary General will promote natural gas as part of sustainable development in international forums such as the UN Climate Conference (COP).

6

geopolitics

To a large degree, a rapid shift to a world economy that is increasingly powered by gas will not be constrained by resources or technology.
The technological and economic viability of gas is well founded but the central issues are political and institutional. The key concern among producing and consuming countries alike is the issue of global energy security. Competition for control of, and access to, natural gas resources, supply routes and markets will set the political agenda. Will strategic maneuvering pit major powers, International Oil Companies, National Oil Companies and consuming countries against each other in the pursuit of energy security? How will Governments resolve these geographical tensions?

During the Malaysian triennium, a special project has been proposed to study this important issue.

7

cooperation with other international energy organisations

IGU will continue to work closely with other international energy organisations such as the World Petroleum Council (WPC), the World Energy Council (WEC), the LNG Conferences (of which IGU is a major sponsor), International Energy Agency (IEA), International Energy Forum (IEF), United Nations and several regional and environmental entities.

8

Research and Development

The IGU Research Conference (IGRC)has been successful in shaping the perception of all players along the gas chain about the need for ongoing research and innovation particularly in the areas related to the environment, rational and efficient use of natural gas and safety. The Coordination Committee will continue to provide support in reinforcing this message.

9

conclusion

The world is undergoing unprecedented changes with global recession affecting every nation in the world. While the energy industry is not spared the effects, the future prospects for natural gas remain positive. In the coming years, as the world recovers, natural gas will be increasingly important as a growing world population demands more energy while at the same time striving for lower carbon emissions.

It is in this context that IGU will continue to evolve to be the spokesman for the world gas industry and contribute to its technical and economic progress. Through its activities, IGU will generate valuable resources and tools that will help management in their strategic thinking and decision-making, while reinforcing the synergies among its members and generating conditions for continuous improvement.

structure and organisation

To support the work as defined in the Triennial Work Programme (TWP), a total of ten Committees, comprising of Programme Committees and Working Committees, and three Task Forces have been set-up and approved by the Executive Committee in September 2008.

Programme Committees (PGC) are those that deal with topics that are external to the gas chain and are dedicated to IGU's image to the world outside the gas industry. There are altogether 5 PGCs covering Sustainability, Strategy, Gas Markets, LNG and Marketing. **Working Committees (WOC)** are dedicated to the gas chain and cover the whole chain from Exploration & Production, Storage, Transmission, Distribution to Utilisation of gas, a total of 5 WOCs. Within the Committees, **Study Groups (SG)** are formed to carry out the work identified. A total of 29 SGs have been established in this triennium to carry-out studies across a wide range of topics confronting the gas industry.

One notable change in the structure is the setting up of a new PGC, PGC E which covers the area of Marketing. The new Committee will fully integrate the activities of the former Intergas Marketing (IGM) into IGU from the 2009 – 2012 Triennium onwards. In addition, it will address other related issues such as the image of natural gas as a fuel, trends, innovation and approaches related to the successful marketing and promotion of natural gas.

To ensure continuity of the work carried out during the Argentine triennium, the scope of some of the Committees has been redefined. For example, PGC C which has been focusing on the development of new markets will now focus also on the mature markets as well as market integration. PGC A will be the focal point for Benchmarking which is an important consideration in building sustainability. The "2030 Natural Gas Industry Assessment" Study initiated during the Argentine triennium, will be a 'live' document and will be continually reviewed and updated by PGC B.

During the Malaysian triennium, three Special Projects will be introduced and will be undertaken by **Task Forces (TF)**. Consistent with the Strategic Guidelines, two of the Special Projects address the human resource aspect covering the "Building of Strategic Human Capital" and the "Nurturing of Future Generations". The third Special Project is in the area of "Geopolitics and Natural Gas", a subject of growing importance given the global nature of the gas industry and the shift towards a gas intensive world.

The overall responsibility for the performance of the committees lies with the Coordination Committee (CC), which comprises of the Chairman, Vice-Chairman, Secretary and all the Chairs of the PGC, WOC and TF. The CC holds at least two meetings every year to evaluate the progress of the Committees and to plan for the deliverables during the course of the triennium and during the World Gas Conference.

Participation in the Working Committees (PGC/WOC) and Task Forces is drawn from the membership and during the course of the triennium, the members will be involved in various meetings, forums, discussions and interactions with external organisations linked to IGU through conferences and constructive sharing of information.

Committee Chairs during the 1st CC meeting
in Kuala Lumpur on 10 - 11 February 2009

1. **Ungku Ainon,** *Secretary CC*
2. **Datuk Rahim,** *President*
3. **Ieda Gomes,** *TF 1*
4. **Ho Sook Wah,** *Chairman CC*
5. **Tengku Nasariah,** *TF 2*
6. **Helene Giouse,** *WOC 2*
7. **Tatsuo Kume,** *WOC 5*
8. **Eric Dam,** *WOC 3*
9. **Joao Toledo,** *PGC C*
10. **Dr Colin Lyle,** *PGC B*
11. **Kamel Chikhi,** *WOC 1*
12. **Juan Puertas,** *PGC A*
13. **Alessandro Soresina,** *WOC 4*
14. **Marc Hall,** *PGC E*
15. **Dirk van Slooten,** *PGC D*

Not in picture
Alaa Abu Jbara, *PGC D*
Mel Ydreos, *TF 3*

scope and deliverables

The bulk of the work from the committees will be delivered during the 25th World Gas Conference, which will be held in Kuala Lumpur from 4 - 8 June 2012.

The deliverables will consist mainly on comprehensive reports which provide sharp insights on the topics selected, identifying key learnings and, in some cases, delivering a set of proposals for future development or improvements.

Other deliverables include case and benchmarking studies, best practices listings and statistical data.

The objective is that the deliverables display an adequate balance between strategic considerations, business issues and technology aspects.

The information produced will be made accessible to IGU members via the website (www.igu.org), among other means. Information of special importance and general interest may be published in accordance with the IGU publication policy.

In addition, intermediate deliverables on specific issues are also a possibility through symposia, seminars a nd workshops as well as publications in the IGU magazine.

III committees and task forces: terms of reference

Malaysia has the world's largest LNG fleet

working committee 1 (WOC 1): exploration and production

Kamel Eddine Chikhi

Dr. Amine Mazouzi

INTRODUCTION

The IGU 2009 - 2012 Triennium will take place within a particular economic context characterised by a global significant slowing growth and a constant increase in world natural gas consumption (1.0% per year in OECD and 2.3% in non-OECD countries).

This demand requires new gas resources that should be discovered in both conventional and unconventional contexts and developed with rigorous processes to provide relevant supply at an appropriate price to the market.

The exploration and the development of these new gas resources are capital-intensive and time-consuming, but have the potential to significantly increase the reserves and production once resources are identified.

Recent statistics exhibit a global decrease of exploration efforts coupled with severe risk management by most operators. Consequently, the number and size of natural gas discoveries are decreasing drastically, thus affecting R/P ratios significantly.

Thus, Working Committee 1 (WOC 1) will focus during this triennium on the significant advances in Natural Gas Exploration and Production that aim to secure a sustainable supply for global development.

The Committee has assigned 2 study groups to deal with specific aspects related to:

1. **Recent Advances in Exploration and Production of Natural Gas;**
2. **Most Significant E&P New Gas Projects.**

We intend to deliver, by the end of the triennium, a comprehensive study highlighting state of the art approaches for assessing, developing and producing natural gas resources. New E&P gas projects will be presented and significant ones will be deeply described as case studies.

STUDY GROUP 1.1 (SG 1.1)

Recent advances in exploration and production of natural gas

Scope and Purpose

Pursuing the work initiated during 2006 - 2009 Triennium, resources and reserves estimations of both conventional and unconventional natural gas will be updated according to IGU regional distribution from published data. Variances will be assessed and their driving factors identified.

Analysis of global and regional exploration key indicators statistically, in terms of efforts (investments, wells drilled), results (success ratios, volumes discovered) and updated screaming curves for significant gas provinces will be undertaken. Global trends for specific areas with significant contribution for mid/long terms gas supply will be highlighted.

The study will focus on E&P activity for assessing, developing and producing new gas resources issued from deep horizons (beneath already producing fields) as well as frontier areas. New hotspots and indirect exploration techniques will be described with typical case studies.

Where are the current exploration hotspots and what are the likely future E&P trends in new plays? The study will share review of recent development technologies and standards linked to gas development based on typical examples for both conventional and unconventional gas. Technology trials on real field will be highlighted (high resolution seismic, tracers etc) as well as techniques having strong implications on sustainable development and environment preservation.

STUDY GROUP 1.2 (SG 1.2)
Most significant E&P new gas projects

Scope and Purpose
Identification of significant current gas projects in terms of technology, reserves, impact on regional and global gas industry including those located in the vicinity of regional consumption areas as well as those associated with remote areas.

A review of the most significant gas projects of this last decade linked with unconventional resources such as Coal Bed Methane (CBM), Shale Gas and Tight Gas.

Mapping of CO2 sequestration alternatives linked with current projects (in co-ordination with WOC 2).

Particular attention will be dedicated to acid gas development projects in SE Asia and pilot gas development projects associated with methane hydrates.

Kamel Eddine Chikhi
Chair, WOC 1
(until 30 July 2010)

Dr. Amine Mazouzi
Chair, WOC 1
(from 1 August 2010)

working committee 2 (WOC 2): storage

INTRODUCTION

The underground gas storage activity is proven to be a valuable part of the gas chain. Underground gas storage is now looked at as a separate business, which is supported by the establishment of independent storage companies and subsidiary companies of integrated energy groups to operate and develop Underground Gas Storage Facilities (UGS).

Operating these facilities in order to both value their flexibility for the gas chain and provide security to customers are getting stronger.

The 2030 Natural Gas Industry Outlook edited by the IGU for the WGC 2009 in October 2009, gives a prognosis on the new global capacities to be developed by 2030. Working gas volumes is expected to rise from 333 Gm^3 in 2005 to 543 Gm^3 in 2030, equivalent to a 63% increase.

This growth will generate numerous challenges for the gas storage communities such as, finding enough skilled professionals, developing new technologies and considering existing and new regulations.

The WOC 2 activities are aim in providing key information to face these challenges, to both its members and decision makers.

The 2009 - 2012 TWP will include:

- informal exchanges on topics of current interest in UGS activity through specific workshops
- three regular activities undertaken by three different sub-groups

STUDY GROUP 2.1 (SG2.1)

Updating and improving the IGU UGS data-base and promoting it as a reference

Scope and Purpose

A comprehensive data base of more than 700 UGS has been built since the previous three triennium. It contains both existing UGS and projects. This data-base and its up-dates are valuable for IGU members and parties interested in the storage business.

Collaboration with other international organisations such as Gas Storage Europe (GSE) or UNECE as well as other potential public bodies to update current available data, will be an objective of this new triennium. Another objective will be to up-date, improve and develop the data-base as well as analyse major trends in UGS activities.

STUDY GROUP 2.2 (SG2.2)

Definition of some best practices in UGS operation and design

Scope and Purpose

The design and philosophy of UGS operating systems can be quite different in different part of the world, according to the characteristics of the facilities, the countries where they are based and the companies owning the sites. However, requirements from citizens and public authorities regarding safety and environmental issues are growing as well as demands from gas customers for flexibility and reliability. These demands are strong drivers to develop common or consistent practices within the UGS community.

Hence it is the objective of this study group to define "Best Practices" of dedicated fields such as:

- methane emissions of UGS
- methanol/glycol consumption for UGS
- gas conditioning
- well integrity assessment
- checking gas inventory
- input data for storage object preparation (i.e. preparation of geological model)
- content of safety and environmental reports for permit application

The list of topics however is subject to changes depending on the interest and support of participating WOC 2 members. The study group SG2.2 will collaborate with PGC A ("Sustainability").

STUDY GROUP 2.3 (SG2.3)
Skills and competencies for UGS activities

Scope and Purpose

Since 2005, the storage sector has noticed the beginning of a technical skills shortage. It is a critical issue for managers either to operate and run the maintenance on existing UGS or to develop new projects. The UGS activity is strongly impacted as skills needed are not only specific but also rather similar to the skills required in the Exploration and Production sector, which tend to receive more focus from companies than UGS activities.

The objectives of this study group are:

- to describe skills, know-how and profiles of professionals needed for UGS activities.
- to assess the number of professionals needed currently as well as in the future decades to achieve planned projects.
- to list the main educational programs and degrees providing requested profiles in various countries.
- to define the types of training programs.
- to facilitate exchanges of students during training periods between countries and companies.
- to indicate ways to provide professionals and the required skills for the storage industry in the future and how to promote attractiveness of the storage industry.

This study group will contribute to the work of the Task Force 1: "Building Strategic Human Capital", which is one of the special projects defined by 2009 - 2012 Triennium.

Hélène Giouse
Chair, WOC 2

working committee 3 (WOC 3): transmission

INTRODUCTION

Different studies have shown that during the next decades there is an increasing demand for natural gas in the global gas markets as the most environmental friendly fossil fuel.

To fulfill the increasing demand for natural gas, more strategic gas transmission infrastructures and long distance pipelines, sometimes operating under extreme conditions, will be necessary.

New gas transmission infrastructures will be the bridge between the market and new or existing gas reserves. These systems must be operated with the goal of ensuring security of supply, within safe and environmentally friendly sets of practices. This means that the new gas infrastructures become more complex and the design and operation of the gas infrastructures must be based on the latest safety regulations and best technical practices. Therefore it is necessary to make use of the best technological innovations available.

During the last decade we saw the beginning of a technical skills shortage affecting the energy industry, including gas. At the same time, gas transmission systems have become more complex due to various technological developments and breakthroughs. The critical question is - do the personnel responsible for maintaining and operating these complex systems have sufficient education and skills to perform their tasks adequately?

To address these issues in a comprehensive manner, three different study groups have been set up:

STUDY GROUP 3.1 (SG3.1)

Strategic gas transmission infrastructure projects

Scope and Purpose

To share lessons learned and practices from strategic gas transmission infrastructure projects (pipelines and compressor stations) and the construction of pipelines under extreme conditions. These cover:

- Cross border pipeline systems:
  - An inquiry into existing and new planned cross border pipelines (including compressor stations)
  - Investigation into experiences of planning, constructing and operating cross border pipelines/compressor stations
- Construction of pipelines under extreme conditions:
  - Investigations (inquiry) into experiences, codes applied, practices and problems in constructing pipelines:
    - In deep water (>1000m)
    - In high mountains
    - In marshy areas (including permafrost)
    - Over long distances (>1000km)
    - In protected areas
    - In densely populated areas
- List of do's and don'ts

STUDY GROUP 3.2 (SG3.2)

Integrity of gas transmission systems and environmental footprint reduction

Scope and Purpose

- To investigate the most important threats to the integrity of pipelines in the different parts of the world and to obtain more insight into the effectiveness of the threat reducing measures.
- To investigate whether the national and international safety and environmental regulations (including emissions) are increasing and whether these regulations are issued by the authorities alone or in close cooperation with gas transmission companies.

The study will cover:

- Investigation into external threats affecting the integrity of pipelines and the measures to reduce these threats with regard to:
  - External interferences
  - External corrosion (including Stress Corrosion Cracking)
  - Ground movement
  - Third party intrusion
- Increasing influence of governmental bodies with regard to the design, construction and operation of gas transmission systems (safety and environmental issues), an IGU inquiry into:
  - Increasing national governmental binding regulation/rules
  - Possibilities for gas transmission companies to influence national governmental regulations/rules
- The societal responsibility of companies to measure their own environmental footprint and to define measures to reduce emissions. This study will investigate the status amongst IGU WOC 3 members.

STUDY GROUP 3.3 (SG3.3)

Securing sufficient expertise to operate gas transmission systems safely and adequately

Scope and Purpose

To study possible means to provide for sufficient expertise in gas transmission companies to operate and maintain complex gas transmission systems safely and adequately.

Qualified expertise is necessary but is becoming in short supply for the purpose of operating and maintaining gas transmission systems safely and adequately. How to provide for this issue? This study group will examine:

- How to determine the required expertise level of personnel?
- Other organisational models necessary to provide for this scarcity (e.g. pooling of personnel, outsourcing activities)?
- Other equipment or systems that require less expertise?
- Does ageing of gas transmission systems require more personnel and other expertise?

This study group will contribute to the work of the Task Force 1: “Building Strategic Human Capital”, which is one of the special projects defined by 2009 - 2012 Triennial Work Programme.

Eric Dam
Chair, WOC 3

working committee 4 (WOC 4): distribution

INTRODUCTION

Gas distribution companies are the part of the gas value chain with the highest visibility to customers, whilst playing a key role in the progressive development of the gas industry. Hence, their performance in terms of quality, safety, reliability and accountability of service is crucial for the overall success and image of the gas industry. The primary role of WOC 4 will be to support the promotion of industry efficiency and accountability.

Presently, gas distribution activities are deeply influenced by various factors, arising from within and outside the industry, such as:

- Market liberalisation, entailing new activities and competencies;
- Regulatory bodies, providing rules that deeply affect business;
- Improved economic performance needs;
- Increasing demands of customers;
- New stakeholders with different demands and influence.

WOC 4 must consider these influencing factors when conducting studies and developing conclusions and recommendations. Establishing the best practices and drawing tools that can be of tremendous benefit to the distribution community will be the key elements of the committee's work.

During this triennium, WOC 4 will focus on the following study areas:

- Gas Distribution Safety Management Systems
- Smart metering systems: characteristics, technologies, costs
- Unaccounted For Gas: identification, measurement, calculation and management

STUDY GROUP 4.1 (SG4.1)

Gas Distribution Safety Management Systems

Scope and Purpose

Distribution operators are expected to improve the quality of their operations in terms of safety without compromising on cost and efficiency. Their performance are monitored by regulatory bodies based on a series of performance indicators. Therefore, operators must develop a comprehensive and effective approach to safety management.

Furthermore, with increasing attention and pressure from society for safety, companies must demonstrate very clearly their efforts and results on safety management to the public.

This study will review processes and methodologies used to develop safety strategies for managing gas distribution pipeline systems. This covers:

- Evaluation and recommendations in the following areas:
  - The identification of ingredients and milestones of a management system devoted to safety
  - The identification of KPIs related to safety management
  - The definition of a set of units to measure KPIs
  - The influence of regulation and legislation
  - The possibilities and role of certification.
- Identification of basic steps to implement a Safety Management System and a list of main KPIs and relative set of units.

STUDY GROUP 4.2 (SG4.2)

Smart metering systems: characteristics, technologies, costs

Scope and Purpose

The frequency and accuracy of meter reading activity at customer's premises has been an issue with growing interest in the industry. Technological improvements are making available solutions that can enable easy and less costly operations, that will benefit both the service companies and end customers by providing other value added services.

This study will review the various technologies and smart index solutions available and identify the best practices in metering activities. The adoption of "smart" metering systems has the potential to provide a sound database for gas balancing, reduce operational cost and thus produce a high satisfaction level for the final customers.

The study will undertake a review of smart metering systems in gas distribution systems including:

- Identification of operations that can be included in smart metering
- Review of smart metering technologies and smart index solutions available
- Identification of best practices
- Availability and applicability of cost/benefit calculations
- Added value for distribution operators and/or commodity business

The study will set a list of operations that can be included in smart metering and draw a basic cost/benefit calculation model to be used by distribution companies to evaluate the opportunity of introducing smart metering systems in their networks.

STUDY GROUP 4.3 (SG4.3)

Unaccounted For Gas: identification, measurement, calculation and management

Scope and Purpose

The accurate management of the quantities of natural gas is a subject of increasing attention in the gas industry. Gas balancing and emissions control are concepts that currently involve all players of the gas chain. Therefore it is necessary to have a thorough understanding of all events affecting gas quantity in each part of the value chain, to allow the proper development of the gas market. In this context, Unaccounted For Gas (UFG) in distribution plays a more significant role.

This study will address the concept of UFG including:

- Definition of UFG
- Identification of main components of UFG
- Definition of a set of units to measure or calculate UFG
- Review approaches adopted for the management of UFG (technical and commercial)

The study will design a tool that can be used by distribution companies to approach measurement or calculation of UFG in their distribution networks.

Alessandro Soresina
Chair, WOC 4

working committee 5 (WOC 5): utilisation

INTRODUCTION

Gas utilisation, which covers the downstream end of the natural gas value chain, holds the key to the future of gas. Amid a growing concern over global warming, it is crucial that we help end users to use gas efficiently and to ensure that it delivers greater energy savings in partnership with renewable energy resources.

The overall objective of Working Committee 5 (WOC 5) is to investigate how gas is used in gas market sectors of member countries, such as industrial, commercial, residential, and NGV. Through analysis and evaluation of technological trends of gas utilisation, the committee intends to share and disseminate best industry practices, thereby contributing to the advancement of the world gas industry.

During this triennium, a special focus will be made on finding ways to harmonise coexistence between gas applications and renewable energy sources. We will focus on advanced gas applications such as m-CHP and fuel cell that are currently under development or in the early stages of market introduction. WOC 5 intends to study not only how their market introduction can be facilitated but also how they can be harmonised with the use of biogas/synthesis gas.

Another crucial issue for the energy industry is reducing CO_2 emissions in the transportation sector. Here again, special attention needs to be given to various promotional activities of NGV as a key challenge facing the gas industry.

The deliverables will include reports and other managerial tools (evaluation models, references, databases, parameters, etc.) that will further support and promote the use of natural gas.

The working committee will conduct its activities in the following three study groups;

STUDY GROUP 5.1 (SG5.1)
Industrial utilisation

Scope and Purpose

This study group will present several case studies to be selected from among the most significant proposals submitted by the members of our committee, with achievements on:

- Significant energy saving by natural gas (case study)
- Harmonising biogas and natural gas for the benefit of customers and gas industry
  - Continued investigation of biogas utilisation by industrial customers
- Investigating new technologies to promote gas sales
  - Gas cooling for process and flame-less combustion technology, etc.
- Integrating information of successful CHP by industrial customers
- Impact of gas quality variation on gas utilisation
- Methods to control calorific variation at the customers

STUDY GROUP 5.2 (SG5.2)
Domestic and commercial utilisation

Scope and Purpose
This study group will build on some of the activities initiated during the last triennium which include:

- Investigating DG Micro co-generation
  - Opportunities and challenges
- Investigating new innovative appliances
  - Future residential units providing pleasant living environment and eco-friendly lifestyles
- Realising harmonious coexistence of gas with renewables; solar heat, solar power, geo thermal heat pump etc.
- Building appliance data base
- Impact of gas quality variation on utilisation.
- Survey on home fuelling appliances for NGV
- Efficiency indicators
- Energy services/value added services for retaining customers in the domestic sector
  - Delivering heat, cooling, electricity produced in small units for a group of houses/ buildings (case studies/success stories)

STUDY GROUP 5.3 (SG5.3)
Natural Gas Vehicles (NGV)

Scope and Purpose
This study group will develop global strategies for NGV commercialisation and market penetration in international markets, using different appropriate technologies (i.e. for different levels of sophistication in vehicles, retrofit, and originally manufactured), covering on and off road applications, including cars, trucks and buses, as well as fork-lifts, boats, trains and other vehicles.

- Monitoring and analysis of world, regional, and local NGV markets
  - Statistics, economics, technology, legislation, government incentives, etc. (update of existing databases)
- Best Practice on CNG refueling stations
  - Experiences of CNG refueling stations; construction strategies and on-site modular installations
  - Government and industrial applications
  - Technical issues for successful refueling business
  - Gas quality / composition
- Investigate impact of bio methane on NGV,
  - Green gas principle and technology
- NGV-related technologies for enhancing efficiency
- NGV for large fleets: its economic interest and incentive

Tatsuo Kume
Chair, WOC 5

programme committee (PGC A): sustainability

INTRODUCTION

Present energy context is moving between the dilemma of supply guarantee and climate change, consequence of the massive use of fossil fuel to resolve energy problems.

In this scenario, energy decisions are favouring the implementation of renewable energies to solve both problems. However, renewable energies are not enough to solve the world's energy supply problem and require a complementary fuel. Natural gas is, without doubt, the ideal fuel for this function and IGU, which has been recognised historically for its environmental and sustainability sensibility, is willing to study these synergies and provide constructive solutions for the future.

In addition, IGU has the will to address any adverse impact of industry infrastructure. For that reason, studies are directed at studying formulas and processes which promote improvements in process efficiency and the safety of operations.

Looking into the future, applicable energy models are appearing which consider two final-use energy vectors: hydrogen and electricity and propose that CO_2 be captured and confined. Undoubtedly, this model will have repercussions in the gas industry which must be analysed.

Accordingly, PGC A proposes the following study areas for this triennium:

STUDY GROUP 1 (SG A.1)

Sustainability and investment

SG A.1.1: The role of natural gas in a hydricity model

Electricity and hydrogen are both clean energy carriers at the end-use point and can be produced through sustainable processes. However, cities must manage smart electric and hydrogen grids. Hydrogen will play the role of store energy for grid management. Hydrogen grids will be settled as clusters growing from service stations. Energy will reach the final user in the form of electricity or hydrogen depending on the cost of their production and handling.

Natural gas could be an alternative to spread hydrogen's use (produced by reforming) in the initial stage, but its main role would be in the efficient production of electricity (always in association with carbon capture and storage processes).

A reasonable scenario will consider comfort provided by district heating & cooling networks with electricity to cover the stationary needs and electricity or fuel cells to cover the mobility needs.

The aim of the study group will be to gather opinions from experts about the viability of this model, analysing the role of natural gas as a transition fuel, and the final outcome and impact should such a model consolidate.

SG A.1.2: Natural gas and renewable energy policies and tools to boost economic growth

Global economy is set to grow in the coming decades, which involves much more use of energy. The present energy system is unsustainable. It is necessary to reduce the fossil fuels demand and to de-couple energy demand from economic growth. In order to achieve these objectives, an improvement in energy efficiency is required.

The use of renewable energies contributes to elimination of GHG emissions and promote a new industry sector that can generate employment and regional development. Besides, for many

energy importing countries, it reduces energy dependence on other countries and therefore has economic benefits.

In the coming years, energy efficiency improvements in buildings, industry and power sector will represent a significant energy saving. In the power sector, between 40% and 50% of the global production would come from renewable energies in the next decade, especially wind, solar and biomass energies. In the transport sector, there will be greater use of biofuels, especially in trucks, ships, aircrafts and, probably, a great increase in the use of electric cars.

Natural gas is an ideal complement to these new energy solutions. With the help of experts in the field, we propose to present the best hybrid solutions between renewable energies and natural gas.

SG A.1.3: Carbon Capture and Storage – the technology and economics

There are some models to mitigate climate change through technology actions, especially in electricity generation, such as:

- more efficient energy conversion technologies implementation,
- higher presence of renewable and nuclear energy,
- coal + Carbon Capture & Storage (CCS) substituting natural gas.

Natural gas will play a significant role in power generation or will be used in final appliances for some decades but the CCS can also give an added value on other fuels such as coal and thus could become a threat to natural gas.

The aim of the study will be to study the state of development of this technology, and to analyse the implications to the gas industry.

STUDY GROUP 2 (SG A.2)

Integrating other gases into the natural gas industry

The utilisation of biogas or gas manufactured from biomass using thermal gasification is becoming a preferred option. The composition of such gases depends on social, political and economic practices. Usually the use of these gases are limited to power generation or heating in the facility where these gases are recovered or produced.

The use of these renewable gases in gas supply opens the possibilities to multiple users and energy demands. Currently, different approaches are being adopted concerning the delivery of these gases from non-conventional sources to distribution or transmission networks.

In the future, with networks becoming increasingly interconnected, national authorities calls for admission to gas network for biogas and gas from biomass due to environmental reasons and renewable gas suppliers wishing to access gas networks. Hence there is a need for proper technical rules and safety standards to ensure that the injection of these renewable gases can be carried out without adverse consequences. The aim of this study will be to set the basis for the natural gas industry to take advantage of these gases, eliminating any possibility of impact on people's health and the useful life of the installations.

STUDY GROUP 3 (SG A.3)

Reduction of gas emissions (A comprehensive industry guide)

The activities of the natural gas industry can have an environmental impact throughout the value chain, from extraction of the wells and its transportation (gas-pipe or LNG) to its distribution and its transformation in the plants.

The impact that the natural gas industry generates, however, is relatively small compared with other sectors, mainly because of the sensitivity that the gas sector has towards the environment. While this may be the case, there are opportunities for further improvement and PGC A proposes the setting up of a study group to capture the best practices in the gas chain and to develop a comprehensive industry guide to reduce gas emissions.

In undertaking this work, PGC A will work with the Vice-Chairs of the WOCs as the focal point to provide the relevant information and analysis.

Juan Puertas
Chair, PGC A

programme committee b (PGC B): strategy

INTRODUCTION

PGC B is responsible for analysis of gas supply, demand, international trade, price formation and regulation, as key factors related to Corporate Strategies.

Our new activities will carry forward the strategic challenges identified in the IGU 2030 Natural Gas Industry Study (presented at Buenos Aires, October 2009).

The last few years have brought about significant changes affecting our industry:

- Natural gas demand responded to strong economic growth and investment, commodity prices reached all-time highs while environmental concerns also increased.
- Regional gas markets expanded, international trade and global price interactions increased, bringing gas onto the political agenda through concerns about gas price volatility and security of supply and demand.
- Unconventional gas sources experienced an upsurge in some developed markets, influencing regional wholesale prices and global LNG trade patterns.

Then, from summer 2008, commodity prices fell sharply with the impact of the global economic downturn. Lower industrial output reduced gas demand. In 2009 it is unclear how long the world will remain in recession, what further intervention Governments will make in the financial and energy markets, and if there will be a new global deal on climate change.

- What are the regional and global implications for the supply/demand balance and gas price formation?
- Which Government policies and regulations will most influence company strategies in each part of the gas chain?
- How can gas companies support economic growth at a time of environmental challenges and economic uncertainties?

To tackle questions like these, PGC B will work in three Study Groups, building on our output from the Argentine triennium:

STUDY GROUP 1 (SG B.1)

World gas supply, demand and trade

SG B.1 will analyse regional scenarios and levels of uncertainty in gas supply, demand and trade. Our focus will be the drivers in different regions during 2000 – 2030, and will include a low CO_2 case. We will consider developing an IGU global gas policy model up to 2050, possibly linking this with the work of SG B2.

We aim to identify current government policies and company strategies that affect indigenous gas supply and demand, local market development and inter-regional trade.

SG B.1 will build and maintain existing relations with the IEA and other external energy institutions and forecasting entities, as well as working with IGU colleagues in WOC 1, PGC A, PGC C and TF 3.

STUDY GROUP 2 (SG B.2)
Wholesale gas price formation

SG B.2 will study the level and implications of gas market globalisation in terms of the effect on wholesale gas price formation and the potential for price convergence across established and new gas hubs.

Our study of the price drivers will develop from the last triennium to include, on the one hand, the political requirements for "affordability" of gas, and on the other, more advanced trading concepts of price elasticity and volatility. How would carbon tax or 'cap and trade' policies affect gas price formation? We will investigate regional pricing models, both for indigenous and international supplies, and examine 'whether or not gas can be subject to the same rules as other commodities?'

We will take forward the IGU global survey of national wholesale prices and gas price formation methods. Our aim will be to include two more years of data, share lessons learned and identify future trends.

Interaction is expected with colleagues in PGC C, PGC D and PGC E.

STUDY GROUP 3 (SG B.3)
Corporate strategy and regulation

Changes in gas regulatory frameworks are increasingly a major aspect of corporate strategy and risk management, leading to adjustments in the valuation, traditional structure, and services of the gas industry in several regions.

SG B.3 will share and study such industry experiences over the last ten years and strategic plans for the next decade. We will identify business models that have been used to mitigate regulatory risk or develop new commercial opportunities. This may include, for example, the effects of unbundling on the value of transmission, storage and distribution assets as well as local and international responses to globalisation.

The analysis of regulatory models around the world carried out during the last triennium, highlighted the regulatory driving forces for structural change. Our study will take this further with a series of case studies that illustrate company responses to technical, commercial and regulatory changes throughout all parts of the gas business.

Together we aim to summarise the lessons learnt, and the key issues for corporate strategy under current and future regulatory regimes. In short, we will seek an answer to the question "How should companies along the whole gas chain respond in the changing business environment?" To this end, we look forward to a productive interaction with all the Working Committees, as well as with PGC C (Gas Markets).

Dr Colin Lyle
Chair, PGC B

programme committee c (PGC C): gas markets

INTRODUCTION

The work of Programme Committee C (PGC C) in the 2009 - 2012 Triennium has been expanded to cover both developing and mature gas markets, and to continue the productive work of the Task Force on Gas Market Integration (GMI) on regional energy and gas market integration. As such, the objective of PGC C will be to analyse the gas markets in both developed and developing countries and draw lessons regarding efficient introduction of gas markets and further improvements in energy security.

The Committee will focus on topics pertaining to the development of mature and new markets, such as the promotion of international integration, harmonisation of rules across national boundaries and security of energy supply, including supply from non-conventional sources and addressing environmental issues. In addition, a strong response to the current financial crisis will be considered, in order to preserve natural gas markets and investments.

Guided by the four Strategic Guidelines for the 2009 - 2012 Triennium, in order to accomplish its objectives, PGC C will work closely with the other Programme and Working Committees within IGU, especially PGC B, D and E, as well as WOC 3.

Activities for the next triennium include analyses of topics on:

- Facilitation for the development of new, developing and mature gas markets
- Natural gas sourcing
- Infrastructure (gas storage, funding)
- Market and economic drivers
- Competing fuels
- Legal and regulatory aspects
- Business opportunities (e.g. power generation)
- Environmental issues (climate change)
- Geopolitics

The Committee has selected three study topics on gas markets under three study groups namely ASEAN and North East Asia (developing), North America (mature) and Europe and Russia (mixed). Upon completion, the three studies will be integrated and analysed for appropriate actions from the perspective of new, developing and mature gas markets.

STUDY GROUP C.1

Gas markets in ASEAN (South East Asia - Malaysia, Indonesia, Thailand, Vietnam, Brunei, Philippines, Myanmar etc) and North-East Asia (China, Korea, Japan and Taiwan)

Scope and Purpose

Energy security and sustainability is high in the agenda of these countries. ASEAN leaders have endorsed an ASEAN Vision 2020 to address its energy security and requirements. For this reason, SG C.1 will continue the work of GMI TF in the past triennium on ASEAN and include the countries of North East Asia of China, Korea, Japan and Taiwan (ASEAN+4) in its portfolio. The group will review and analyse security of energy supply, identify local gas market drivers of demand/ supply, explore additional supply from non-conventional sources such as Coal Bed Methane (CBM) and methane hydrates and examine emerging issues and challenges on the integration and harmonisation of technical/ commercial areas that require extensive cooperation of all industry players and Governments in the new, developing and mature markets.

The group will aim at:

- Assessing security, reliability, and sustainability

of gas supply and consolidating gas demand for the region. Non conventional gas as additional supply will be examined, including alternative supply sources
- Identify emerging issues and challenges in developing and growing gas markets and potential LNG imports within the region. (e.g. Indonesia will allocate higher priority of its gas supply for domestic consumption; Technical difficulties and management of CO_2 have delayed potential supply sources from the high CO_2 gas fields)
- Identify opportunities to further develop and grow gas markets. Demand centres are away from supply source. Long term availability depends on upstream development and downstream infrastructures
- Identify investments /funding throughout the gas supply/demand chain

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STUDY GROUP C.2
Gas Markets in North America

Scope and Purpose
The group will analyse and identify key gas market drivers and will investigate the practical issues relating to developing a market based on supplies from non-conventional sources, such as CBM; tight gas sands and shale gas.

The Group will aim to:
- Examine non conventional gas as an additional and alternative supply and identify the legal, technical and economic challenges that are facing the world's largest and most price responsive gas market. The US and Canada are among the leaders in tight gas sands development, but can production be prolonged? Can the prospects of CBM in Canada be sustained with enhanced technology? Shale gas (a vast resource that has become economic to produce as wholesale prices have risen) will also be examined
- Identify emerging issues and challenges in developing/growing gas markets (e.g. improving market efficiency, achieving harmonized approaches to gas infrastructure, the use of North American Standards, the integration of legislative and regulatory regimes for energy within the region, as well as potential new sources of gas supply into the USA), contraction of hydrocarbon labour force, geopolitical factors, cost of gas production, climate change and carbon capture and storage
- Identify opportunities to further develop and grow and integrate the North America gas market

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STUDY GROUP C.3
Gas Markets in Europe and Russia

Scope and Purpose
SG C.3 will identify and analyse the gas markets in Russia and in a few key countries in Europe with particular emphasis on addressing energy security issues. Key market drivers of demand and supply will be identified and emerging issues and challenges addressed. The group will also follow up from the study report of the past triennium on "Developing Gas Markets in South Eastern Europe".

The Group will aim to:
- Assess the supply-demand balance in key parts of the region where demand centres are not in the proximity of reserves
- Identify emerging issues and challenges in developing and growing gas markets (e.g. Europe energy security depends on Russia, the world's largest supplier of natural gas)
- Identify opportunities to further develop and grow gas markets. Countries are at different levels of economic development: mix of emerging, developing and mature markets
- Study investment climate and funding needed to monetise gas fields to build/add infrastructures across several nations to deliver gas to the downstream market.

All these Study Groups will work closely with WOC 1 on issues relating to conventional and unconventional gas reserves and will exchange information with PGC B SG B.1 which is responsible for the overall supply/demand analyses in the eight IGU regions.

João Batista De Toledo
Chair, PGC C

programme committee d (PGC D): liquefied natural gas (LNG)

INTRODUCTION

Since the 1960's when Algeria first signed an LNG Agreement with the UK, the LNG industry has gone through phenomenal growth and several evolutions. From a regional business focused primarily in the Pacific Basin, it is now a global business. In the last 10 years, liquefaction capacity has more than doubled.

The global financial and economic crises have presented new challenges to the LNG business. Global demand for LNG has taken a slight dip as a result of the economic downturn affecting the major LNG importing countries. The negative impact on prices and the persistent high cost of construction have affected the start-up of new projects, while others are indefinitely delayed or shelved, which will have long-term implications of the supply balance. At the same time, committed projects will add new volumes into the market in the next few years, presenting new marketing challenges in a world beset with lots of uncertainties.

PGC D role is to monitor and promote the development of the LNG business. The committee will study topics of current importance and interest to LNG industry participants and interested observers from other segments of the natural gas industry. The output of the committee will provide a clear understanding of the global LNG industry and the challenges ahead.

The committee will monitor the LNG business by issuing a report, which will provide historical data on the global LNG trade, LNG liquefaction capacity, LNG shipping fleet and regasification terminals. In addition, the report will highlight emerging trends within each part of the LNG value chain.

The committee wants to build a bridge between the excellent leadership during the Argentinean presidency and the Malaysian triennium by expanding on areas that have been studied in the 2006 - 2009 and introducing new topics. For this purpose, three study groups will be set up, with contributions from experts within each field, covering the following subjects:

STUDY GROUP 1 (SG D.1)
Enhance terminal compatibility

Scope and Purpose

Global trade of LNG has increased by more than 30% between 2004 and 2008. The share of spot trade in total LNG trade has increased from only 5% in 2004 to around 20% in 2008. However, significant hurdles to enhance global trade still exist. Ideally, an LNG vessel should be able to load an LNG cargo at any terminal in the world and discharge LNG wherever it is needed most. However, differences in technology, sizes and configurations for ships and terminals, limit the ability to trade LNG freely. Further, LNG quality and inter-changeability remains a barrier to LNG being fungible in all markets. Study group D.1 will gather information on existing loading and receiving terminals' compatibility with various ship sizes and configurations. In addition, it will develop recommendations for enhancing compatibility between the full range of LNG ships and loading and receiving terminal facilities.

STUDY GROUP 2 (SG D.2)
Penetrate new markets for LNG

Scope and Purpose
New markets for LNG have been successfully penetrated during the past few years. Argentina, Brazil, Kuwait and Dubai are examples of new entrants into the LNG arena. Many more countries exhibit a potential for entry of LNG, but have not done so as yet. With new LNG production capacity additions in the next few years and a temporary slowdown in the demand growth for natural gas driven by the global financial and economic crisis, the opening up of new markets for LNG could play an important role in the efficient utilisation of new gas resources. SG D.2 will study recent new market entrants to identify the factors that have led to the development of these new markets for LNG. Also, it will seek opportunities to apply the learnings to other markets and develop creative solutions to bring LNG to markets and customers and eliminate barriers to LNG's entry into the market.

STUDY GROUP 3 (SG D.3)
Enhance efficiency in the LNG Value chain

Scope and Purpose
New LNG projects will find it increasingly hard to meet the key criteria of profitability and public acceptability. LNG plants are likely to be in more remote and hostile locations, involve more difficult gases, or not have economies of scale – and they will be challenged by the current high construction costs and lower natural gas prices. Additionally, LNG plants and terminals are subject to increasing public opposition and environmental pressure groups. SG D.3 will explore various alternatives (such as new onshore and offshore technologies, and different construction approaches) that can address issues including remote locations, relatively small gas reserves, low quality feed gas and NIMBY opposition. Further, the group will look for opportunities to enhance efficiencies in existing facilities by reducing gas/energy consumed in existing LNG plants, ships and terminals with debottlenecking, flare and boil off reduction, reliquefaction, use of cold energy and other innovative solutions.

Alaa Abu Jbara
Chair, PGC D

programme committee e (PGC E): marketing

INTRODUCTION

The image of natural gas as the fuel of choice is currently facing major challenges where climate change has become one of the top political issues, customer's ecological awareness and the requirement for using "green" energies has strongly increased. Furthermore security of supply has become one of the biggest political issues with domestic gas reserves running short in many regions. Electricity that is generated from renewables or nuclear power is fast gaining ground as a competing fuel based on the argument that they are more able to give adequate answers to the challenges mentioned.

Based on this premise, a new programme committee on Marketing (PGC-E) has been formed, from the former Intergas Marketing (IGM). The role of PGC-E is to identify and develop ideas, tools and products for successful promotion and sale of natural gas.

During this triennium, the Committee will divide its work into three study groups covering the following areas:
1. Natural gas and renewables
2. Marketing campaigns
3. Image of natural gas and communication

The work of the study groups will be largely based on success stories, evaluating the key drivers behind them.

The deliverables at the end of the triennium will be to provide a deeper knowledge and understanding of how to promote the numerous advantages of natural gas in comparison with other fossil fuels.

STUDY GROUP 1 (SG E.1)
Natural gas and renewables

Scope and Purpose
This group will identify the position of natural gas in combination with renewables in the future energy market.
- natural gas with solar
- natural gas with wind
- natural gas with biogas
- natural gas with ambient heat

Furthermore the group members will submit case studies of successful combinations of gas with renewables. These studies will focus particularly on the marketing strategies of those technologies and how they have been successfully applied.

The group will also select the most significant technology or combination that provides the most promising future for natural gas and renewable.

STUDY GROUP 2 (SG E.2)
Marketing campaigns

Scope and Purpose
This study group will first scan the market and provide an overview of the existing marketing strategies of natural gas across different sectors (retail, industry and power generation).

The next step will involve an optimisation of the value of natural gas (including gas packages/ solutions) within all sectors.

Finally the group will analyse the marketing campaigns adopted and provide a view of the key factors of success and pitfalls and possible failures.

STUDY GROUP 3 (SG E.3)

Image of natural gas

Scope and Purpose

This study group will analyse the positive and negative perceptions of natural gas:

- Image of natural gas as a fuel
- Socio-political image of natural gas
- Image of the natural gas industry
- Image of natural gas technologies

It will then develop guidelines for improving the image of natural gas.

Another objective is to organise a high-level Marketing Managers' Summit during the triennium to share information and to strengthen network among the marketing community. It is also proposed that during this event, awards will be given for the best advertisement for natural gas from electronic media and print media.

Marc Hall
Chair, PGC E

task force 1 (TF 1) :
building strategic human capital

INTRODUCTION

A recent survey among 22 top international natural gas and oil companies ranked the shortage of talent as the most important issue facing the industry. The shortage of talent in the industry has transformed from an organisational challenge into a critical business issue. Demand has outstripped supply with the rapid growth of new projects/ markets and expansion and maintenance of current ones. The problem is further exacerbated by the ageing demographics, leading to the retirement of many experts and the diminishing number of young talent interested in technical careers. If the issue is not addressed, it could potentially impact corporate growth, financial performance, safety and reputation. Competition from within the industry creates additional complexities for recruitment and retention.

The issue calls for an industry response. Immediate and innovative solutions must be urgently found for the industry to sustain its continued growth and to ensure its continued safe operations. The challenge is to have a comprehensive understanding and strategic approach to building human capacity to ensure that both the numbers and level of knowledge will be sufficient for all parts of the future global gas industry in the entire value chain.

Objective

To understand the key issues impacting the attraction and retention of talent in the gas industry and develop a strategic approach to human capacity building to ensure sufficient capable manpower are available at the right time and place for the future sustainability and integrity of the gas industry.

Scope

1. Map critical talent and human resources necessary to deliver projects and business across the gas value chain, from production to utilisation.
   - Conduct a survey across IGU's members to understand the demographics of the industry and what are the commonalities and specificities across regions and industry segments
   - Understand which skills and resources are necessary to deliver the gas business of today and develop the gas industry of the future
2. Identify gaps and key human resource issues impacting the gas industry in the short and long term, particularly in recruitment and capability development.
3. Analyse the factors contributing to the shortages of manpower.
4. Assess the impact of the economic downturn in recruiting, development and retaining talent.
5. Compile best practices across the gas value chain segments and regions including Diversity and Inclusion, Generation-Y, cross-industry institutions and programmes aiming at developing local talent.
6. Assess the role of governments, industry associations, universities and private companies.

Deliverables

1. Triennium Report with Conclusions and Recommended model for adoption by the industry.
2. Regional workshops/thematic video conferences involving local and international gas and oil associations, NOCs and IOCs and consultants. Workshops aimed to coincide with IGU council meetings to allow participation of charter and associate members.
3. Roundtable forum during WGC 2012.
4. Periodic articles for conferences and President's presentations during the triennium.
5. Compilation and sharing of best practices adopted by the industrial at company and regional levels.

Ieda Gomes
Chair, TF 1

task force 2 (TF 2) :
nurturing the future generations

INTRODUCTION

The oil and gas industry has suffered from negative perception in the last two decades as an unattractive and difficult industry offering little prospects for career growth and advancement. It has been also perceived as a sunset industry as hydrocarbon reserves eventually dries up. The consolidation of the industry in the 1990s and the massive layoffs that resulted from them further discouraged young people from joining the industry. There is an apparent trend among young people today to focus on the more "lucrative" careers in finance, IT and law or in areas which seem to be contributing to their idealistic views of the future hence the growing disinterest in the sciences and engineering careers among men and women. To ensure future sustainability, the gas industry needs to re-brand itself to make it more attractive to offer career opportunities to future generations. Such an effort has to be nurtured from a young age to stimulate an interest in science and mathematics, leading to engineering studies and finally to gas-related disciplines. The challenge is to develop a comprehensive approach drawing upon the experiences of different organizations (eg Siemens, Shell, BP, PETRONAS, etc.) and countries that have successfully implemented specific programs to designated age segments.

Objective

To develop a comprehensive approach to nurture the future generations towards the gas industry and to implement specific programs to address the Youth during the 2009 - 2012 Triennium and at the 25th World Gas Conference.

Scope

1. Identify factors that can attract the youths towards an interest in Science and Technology
2. Compile programmes and initiatives (best practices) adopted by various organizations and countries
3. Develop a framework of approaches to nurture interest in Science, Technology, Engineering, Mathematics (STEM) and the Gas industry, targeting specific age groups, such as:
   a. Pre-school
   b. Primary
   c. Secondary
   d. University
4. Design and implement specific programmes for the youth (Age: <27 years during the Triennium) such as essay competitions, interactive communication through internet media, debates etc and during the 25th WGC 2012. (Specific Youth Programme, Career Talks, Forums etc.)

Deliverables

1. Report on factors and approaches to attract youth to the industry.
2. Compilation of the best practices adopted by industry/companies.
3. Publication/toolkit development on "Understanding the gas industry."
4. A framework of approaches that can be adopted by industry for impactful results.
5. Interactive Forum during WGC 2012.
6. Specific programmes/activities with the youths during the Triennium.
7. S&T carnival for the youths during WGC 2012.

Soh Mey Lee
Chair, TF 2

task force 3 (TF 3) :
geopolitics and natural gas

INTRODUCTION

Demand for primary energy is expected to grow in the coming decades in line with the world's expanding economy, rising population, as well as growing prosperity. Of all the sources of primary energy, by far, Natural Gas has emerged as the most attractive fossil fuel owing to the premium it commands, particularly in terms of environment-friendly feature (as compared to oil or coal), vast resources, as well as technology and innovation that allow natural gas to reach consumers in a safe, reliable and efficient manner. In this context, Natural Gas is widely regarded as the fuel of choice on the way to a future of sustainable energy.

At the forefront of growing eminence of natural gas is the key issue on global energy security as producing and consuming countries compete for control of resources and markets. In this light, the United States is becoming increasingly dependent on natural gas, which supplies more than one quarter of its total energy requirement. The US relies heavily on the North American supplies for most of its gas, but is faced with the rapid pace of depletion of those reserves and few untapped fields available for exploitation. The recent significant shale gas findings and development hold significant promise but the need for gas from other regions such as Qatar, Nigeria and Russia may become more acute.

Development of unconventional gas and the impact of new energy policies under the new presidency will determine the exact call on international gas markets. Similarly in Europe, the share of gas imports in the energy equation is also projected to rise. The European Union has expressed concern about the growing dependence on imports, notably from Russia, while Russia has expressed concern about security of demand regarding the evolving EU energy market. Developing nations like China, India and Korea are turning to gas due to environmental pressures, but are highly dependent on external sources of supply. A key factor in the geopolitics of gas is the heavy concentration of reserves in a relatively small number of producing countries that will further heighten the security of supply imbalance.

The top 5 producers (Russia, Iran, Qatar, Saudi Arabia and UAE) hold nearly 67% of the world's proven reserves. NOCs control more than 80% of the oil and gas resources, and there appears to be a trend towards 'Resource Nationalism'. The various market structures along the gas value chain are a reflection of the socio-economic and political preferences of producing and consuming countries.

Competition for, control of, and access to natural gas resources and markets will set the political agenda and strategic manoeuvring that will pit major powers, IOCs, NOCs, and consuming countries against each other in the pursuit of energy security.

Concerns about import dependence and tensions between producing and exporting countries should be dealt with if the world economies are to take the full benefit of natural gas in their energy and environmental policies. Natural gas will be at the centre stage.

Objective

1. To understand and examine the interplay between economic and political factors in the development of Natural Gas resources and analyse the main political challenges, mega-trends, issues and consequences that may shape and drive the future natural gas-intensive world.

2. To engage the international community of stakeholders (particularly on the interface between politics and industry) in a dialogue, aimed at:
   a) creating greater awareness of the potential hurdles to a growing international gas market, and
   b) fostering co-operation between the industry and policy makers in producer and consuming countries
3. To distill potential recommendations for further advancement of the co-operation between the relevant actors (e.g. policymakers, institutions, fora and the gas industry), to be put before the WGC 2012 Round Table

Scope

1. Describe the landscape of the governments, institutions and fora involved in gas policy making and their interfaces.
2. Verify common ground between the views held by the industry and regional energy policies of the value and potential of natural gas as the bridging fuel towards sustainability of the 21st Century.
3. Examine the key drivers affecting the development of Natural Gas resources, focusing in particular on the interplay between economics and politics in the context of global energy security. The analysis should take into account the following:
   - Regional geopolitics and unique features of different regions
   - Future gas business models and their implications
   - Development perspectives, including major regional markets of gas distribution and LNG
   - The role of renewables, clean coal and nuclear energy
   - Challenges for the future and potential pitfalls
   - Interdependency and transparency – Resource nationalism and market nationalism
   - International gas trade- Challenges and opportunities
   - Historical Case Studies and lessons learned for the future
   - Future threats, including terrorism
   - Gas cartel – Will it work?

Note: The reports to be produced are not meant to be exhaustive representations of the current standing of natural gas as seen from every possible angle. Instead, they should be short, synthesising the main factors that could stand in the way of realisation of an aspired and/or potential role of gas in future energy systems. The work of this taskforce differs from the work done by the IGU committees in the sense that it focuses on the views (and perhaps prejudices) held by the "outside world", and uses its reports as a basis for dialogue.

Deliverables

1. During the next Triennium
   - Regional Roundtable Forums
2. Shortly before the WGC 2012:
   - Overall Report - Development, Trends, Issues and Challenges
   - Separate Regional Reports – 3-4 Regions (Specific Issues and Alternative Scenarios)
3. At the WGC 2012
   - Strategic Round-table

Mel Ydreos
Chair, TF 3

IV general information

Traditional trishaws ferry passengers briskly across historical Melaka

 Sarawak's Mulu Caves are a spellbinding sight to behold

study group summary for the 2009 - 2012 triennium (as of october 2010)

Committee	Study Group	Topic
WOC1	SG 1.1	Recent Advances in Exploration and Production of Natural Gas
WOC1	SG 1.2	Most significant E&P New Gas Projects
WOC2	SG 2.1	Updating and improving UGS Database and promoting it as a reference
WOC2	SG 2.2	Definition of some best practices in UGS operations and design
WOC2	SG 2.3	Skills and competencies for UGS activities
WOC3	SG 3.1	Strategic gas transmission infrastructure project
WOC3	SG 3.2	Integrity of gas transmission system and environmental footprint reduction
WOC3	SG 3.3	Securing sufficient expertise to operate gas transmission systems safely and adequately
WOC4	SG 4.1	Gas Distribution Safety Management System
WOC4	SG 4.2	Smart metering system: characteristics, technologies and costs
WOC4	SG 4.3	Unaccounted For Gas: Identification, measurement, calculation and management
WOC5	SG 5.1	Industrial utilisation
WOC5	SG 5.2	Domestic and commercial utilisation
WOC5	SG 5.3	Natural Gas Vehicles (NGV)
PGCA	SG A.1	Sustainability and investment
PGCA	SG A.2	Integrating other gases into the natural gas grid
PGCA	SG A.3	Reduction of gas emissions (A comprehensive industry guide)
PGCB	SG B.1	World gas supply, demand and trade
PGCB	SG B.2	Wholesale gas price formation
PGCB	SG B.3	Corporate strategy and regulation
PGCC	SG C.1	Gas markets in ASEAN and NE Asia
PGCC	SG C.2	Gas markets in North America
PGCC	SG C.3	Gas markets in Europe and Russia
PGCD	SG D.1	Enhance terminal compatibility
PGCD	SG D.2	Penetrate new markets for LNG
PGCD	SG D.3	Enhance efficiency in LNG value chain
PGCE	SG E.1	Natural Gas and renewables
PGCE	SG E.2	Marketing campaigns
PGCE	SG E.3	Image of Natural Gas
TF 1	Special Project	Building Strategic Human Capital
TF 2	Special Project	Nurturing the Future Generations
TF 3	Special Project	Geopolitics and Natural Gas

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venues of IGU meetings during the 2009 - 2012 Triennium

Year	Event[1]	Venue
2010 6 – 8 April 18 – 22 October	 IGU Executive Meeting IGU Council and Executive Meeting	 Bali, Indonesia Doha, Qatar
2011 5 – 7 April 3 – 7 October	 IGU Executive Meeting IGU Council and Executive Meeting	 Rio de Janeiro, Brazil Dubrovnik, Croatia
2012 13 – 15 March 4 – 8 June	 IGU Executive Meeting 25th World Gas Conference[2]	 Houston, USA Kuala Lumpur, Malaysia

[1] All Council and Executive Committee meetings will be preceded by Coordination Committee Meetings.
[2] IGU Council and Executive Committee meetings will precede the World Gas Conference.

V 25th world gas conference

Multicultural Malaysia embraces a rich assortment of dance and performance traditions

 Classical Indian dance is a fluid combination of colours and motion

message from the NOC chairman

25th world gas conference
kuala lumpur, malaysia
4 - 8 june 2012

The gas industry has experienced encouraging growth in the last few decades. While the realities of the world economy today continue to pose a challenge to the profitability and growth of our industry, gas companies have exhibited resilience and ingenuity in dealing with this tough market environment. In this environment, gas players have an opportunity to re-asses their strategic directions and competencies and prepare for the coming economic upturn.

Furthermore, with the increasing awareness of the need to limit carbon emissions to the atmosphere to halt climate change, gas is increasingly seen as cleaner source of energy, which would ease the world's evolution towards a low carbon economy. Thus, the gas industry is poised to take on an even more important role in the world's energy future, in tandem with the growth of interest in renewable and alternative energy resources.

As an important regional gas player, Malaysia expects to leverage on its track record as a reliable liquefied natural gas (LNG) exporter and operator of an extensive gas pipeline network, as well as its central location within the Asia Pacific region. Having developed significant gas infrastructure, resources and human capital, gas industry players in Malaysia are expected to continue to contribute to the growth of the global gas industry.

It is indeed an honour for us to welcome the delegates to the 25th World Gas Conference to Kuala Lumpur in 2012 to celebrate the Silver Jubilee of this important industry gathering. With its theme **'Gas : Sustaining Future Global Growth'**, it is my hope that the culmination of our three years of effort under the Malaysian Presidency will contribute towards charting new strategies, gather critical input and with our concerted efforts, harness the future role of gas in the global arena.

As the incoming NOC chairman, I look forward to personally welcoming you to our conference, which I hope will be the starting point of a mutually beneficial partnership and a shared vision towards building a sustainable future for the gas industry.

I would also like to take this opportunity to express my deepest gratitude to my predecessor Datuk Wan Zulkiflee Wan Ariffin for having laid the groundwork for WGC 2012. With the passing of the baton to me, I hope to continue to build upon this foundation and ensure that the upcoming conference will be a beneficial platform for industry players in mapping our industry's future global growth.

I am confident that Kuala Lumpur's blend of cutting-edge modernity and multi-ethnic cultural diversity, set against the backdrop of the iconic PETRONAS Twin Towers and lush equatorial vegetation will definitely present our WGC 2012 delegates with a delightful and memorable experience.

Looking forward to see you in Kuala Lumpur.

Datuk Anuar Ahmad
Chairman, National Organising Committee

Malaysia Truly Asia

A bubbling and bustling melting pot of races and religions, Malaysia has a truly diverse culture that is reflected by its hundreds of colourful festivals and variety of gastronomical delights. It's no wonder we love celebrating and socialising. As people, Malaysians are very laid back, warm and friendly.

Geographically, Malaysia is as diverse as its culture. Situated in the central part of Southeast Asia, the Federation of Malaysia is made up of 11 states in the peninsula of Malaysia and two states on the northern part of the island of Borneo, and separated by the South China Sea. Sitting almost directly on the equator, Malaysia is a tropical country featuring dense rainforest on rugged landscape. Cool hideaways are found in the highlands that roll down to warm, sandy beaches and rich, humid mangroves.

It is also a land of extreme contrasts where the ancient and modernity co-exist in harmony. It's not uncommon to find towering skyscrapers looking down upon wooden houses built on stilts, and five-star hotels sitting several metres away from ancient reefs.

If you are planning a trip full of surprises, eclectic cultures and natural wonders, the place is Malaysia.

World Class Venue

With Kuala Lumpur Convention Centre set to become the venue for World Gas Conference 2012, delegates and exhibitors will have the benefits of world class facilities and state-of-the-art infrastructure. Already considered to be amongst the best in the region, it is located in the heart of Kuala Lumpur itself, and is easily accessible with a number of transport hubs and major hotels within walking distance. The inclusion of the scenic KLCC Park, iconic PETRONAS Twin Towers and vibrant Suria Shopping Complex serve to lend a prestigious address to Kuala Lumpur Convention Centre.

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