



# Guess Who's a World Leader in... Natural Gas?

Which country uses the most natural gas per capita:

**Great Britain, Germany, Japan or Saudi Arabia?**

**The right answer** is the one you may not expect – the Kingdom of Saudi Arabia. In fact, Saudi Arabia is a world leader in per capita gas consumption. Mind you, this is high value-adding consumption: much of the gas is converted to valuable petrochemicals, plastics and fertilizers for exports and domestic use.

Most people know Saudi Arabia as an oil producer and exporter. Indeed, the Kingdom holds one-quarter of the world's crude oil reserves, and it's the world's top oil supplier. But for decades, Saudi Arabia has also been developing its gas reserves, and today it ranks number four in the world in proven gas reserves and number eight in gas production. And climbing.

Saudi Aramco, the Kingdom's energy company, operates a far-flung network of ultra-large gas processing plants, gas liquids fractionation centers, and pipelines known as the Master Gas System.

The system serves a world-class petrochemical industry on both of Saudi Arabia's coasts – at Jubail on the Arabian Gulf and at Yanbu' on the Red Sea. Gas is also used as fuel for the country's expanding electric power grid and water desalination complexes. Saudi Arabia is also the world's largest exporter of liquefied petroleum gas or LPG extracted from natural gas.

Saudi Aramco has long viewed gas as crucial to the Kingdom's economic future. That's why it stepped up exploration and production of deep gas, and why it joined recently in a project with other major energy companies to develop new gas resources in the remote Rub' al-Khali, or Empty Quarter.

أرامكو السعودية  
Saudi Aramco



*Energy to the nation. Energy to the world.*

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





<sup>1</sup> The French word "charrette" means "cart" and is used to describe the final, intense work effort expended by art and architecture students to meet a project deadline. This use of the term is said to originate from the École des Beaux Arts in Paris during the 19th century, where proctors circulated a cart, or "charrette", to collect final drawings while students frantically put finishing touches to their work. The National Charrette Institute (NCI) charrette combines this creative, intense work session with public workshops and open houses. The NCI charrette is a collaborative planning process that harnesses the talents and energies of all interested parties to create and support a buildable plan (see [www.charretteinstitute.org](http://www.charretteinstitute.org)).

management, to strategic thinking, to final presentation formats.

- Give special attention to addressing a variety of other urban systems from an energy perspective, including land use, water, waste water, storm water, materials management, ICT, housing, open space and economic development); and
- Engage many different disciplines and perspectives in the design process – including participation in charrettes<sup>1</sup> and workshops – with the objective of finding positive synergy between energy pathways and other regional plans.

To promote collaborative forms of planning and decision-making, the pathways will:

- Be developed by teams representing three or four different sectors (public, private, civil, academic);
- Benefit from a shared set of methods and tools, including contributions from every team; and
- Standardise a portion of the analytical methods and visualisation tools, to allow for easy comparisons, and learning.

Given the emerging vision for the consecutive phases it was decided to deliver a website to IGU instead of a document. The website describes the process in detail and provides a rough skeleton to support some of the phase three needs we are anticipating such as discussion forums, and background information. The website will:

- Allow participating cities the flexibility to showcase the project to their funders and partners;
- Provide a starting point for the network secretariat;
- Provide a central home for participants to communicate and learn across international boundaries;
- Provide a faster more efficient method of sharing and updating information;
- Allow a means of sharing interim results and comparing between participating cities; and
- Facilitate greater project exposure to the general public and an increased awareness.

The website is designed to allow both public access and members only access. The public will be able to view the project details and track progress and results of the various participating cities. Members will be allowed additionally to make changes to the site, upload their data for viewing and participate in discussion forums.

We have secured the web address and are busy uploading and refining material and navigation. It is still in draft format but readers are invited to view the website at [www.bridgingtothefuture.com](http://www.bridgingtothefuture.com). This link will bring you to the public viewing area where you can then register as a member to view the more detailed site. We believe the website is an added value to the project and that it will be a central part of the consecutive phases.

#### *Ad 2b Market for Natural Gas Vehicles*

For the sub-project on NGVs the intention is to develop a marketing strategy model for new implementation situations. The input for the model development will be the evaluations of existing markets for NGVs, both successful and unsuccessful. Such markets include Argentina (Buenos Aires), Brazil, Egypt, Germany, India (New Delhi), Italy, New Zealand and Sweden. All these markets have their own specific characteristics. To identify all these characteristics and the results of the actions and decisions taken by government and commercial parties, the key success factors (to develop the specific market successfully) can be abstracted. By combining the individual cases, their characteristics and their key success factors, a generic model can be developed to determine an optimal marketing strategy for a potential new market. The input of the model should be the scores of the "new" market on the relevant factors, which can be environmental issues (urban air quality for example), fiscal policy, energy supply, etc.

The model has to be developed by the end of 2004 and should be applied to some practical cases. The results of these applications will be presented to the World Gas Conference in Amsterdam in 2006.



# LNG

## THE FUEL OF FIRST CHOICE

With the recent International Certification of  
ISO9001:2000 for Quality Management System,  
ISO 140001:1996 for Environment Management System  
and ISO/IEC17025:1999 for Laboratory Service,  
Brunei LNG will continue to be amongst the leader in  
the Industry



**BRUNEI LNG Sendirian Berhad**  
Together For A Better Future

Brunei LNG Sendirian Berhad  
Lumut KC-2935  
BRUNEI DARUSSALAM

Tel: +673-3-236901/236862  
Fax: +673-3-236919/236892  
E-mail: [norlizan.b.md-sani@shell.com.bn](mailto:norlizan.b.md-sani@shell.com.bn)



**Quality Management System**  
ISO 9001:2000



**Environmental Management System**  
ISO 14001:1996



**ISO/IEC17025:1999**  
"Laboratory Service"



## International Cooperation

IGU cooperates with a number of related international organisations and also has contacts with energy-related projects.

### ● Cooperation with related international organisations

#### *Intergas Marketing (IGM)*

As an affiliated organisation to IGU, IGM closely coordinates its efforts with those of IGU in promoting the use of gas worldwide. The Secretariats of both organisations were merged at the end of May in order to increase efficiency and the websites are also now hosted in the same place and looked after by the same webmaster.

The 93rd Session of IGM was held in Helsinki, Finland, on May 16 and 17. During the meeting the Working Groups on enquiries into customer satisfaction and entering into new markets made progress reports. The customer satisfaction surveys seem to support the conclusion that for industrial customers price is the main issue, while for domestic customers the image of gas as a clean fuel plays the most important role. Especially in Finland it was clear that gas users are much more positive about gas than non-gas users.

The main new markets presented were for NGVs and heat pumps. The NGV market in Europe is really developing. In Germany, for example, there are now around 500 filling stations and 500 more are planned, while local schemes to encourage the public to buy NGVs have proved successful. For instance in Thüringen the concerted efforts of all stakeholders resulted in the highest level of NGVs per capita.

The market for heat pumps especially for cooling is expected to increase. The technology of gas-fired air conditioners is now mature and although they are too noisy for home use, there is

scope to develop sales in industrial market sectors such as warehouses.

The 93rd Session also launched the study on how the gas industry can develop into a corporate responsible citizen that will be IGM's contribution to the IGU TWP.

The next IGM meeting (the 94th Session) will take place in Berlin, Germany on October 8 and 9.

#### *Marcogaz*

On 26 March in Doha, Qatar, the IGU Executive Committee accepted Marcogaz as an affiliated organisation to IGU. The agreement was signed by George Verberg, President of IGU, and Klaus Homann, President of Marcogaz, and will allow both organisations to exchange information and cooperate on technical issues related particularly to gas transmission, distribution and utilisation. Positions and views expressed by Marcogaz at European level will be shared at the international level. Marcogaz will benefit from the opinions and experience of the gas industries of non-European countries. This agreement will improve the overall coherency and efficiency of the representation of the gas industry worldwide.

#### *International Energy Agency (IEA)*

There is a close cooperation between IEA and IGU with respect to the Special Project on Gas to Power. Workshops are organised in cooperation with IEA. For further information on IEA please refer to [www.iea.org](http://www.iea.org).

#### *UNFCCC COP 10*

The CC Chairman and the Secretary General in cooperation with the Chairman of PGC A and the Special Project on Sustainability will consider the possibility of an IGU contribution to the 10th session of the Conference of the Parties (COP 10) to the UN Framework Convention on Climate change (UNFCCC). This will be held in Buenos Aires between December 6 and 17. (For more information see <http://unfccc.int/cop10/index.html>.)





## ● **Contacts with energy-related projects**

### *NaturalHy Project*

The possible use of existing pipelines for distributing mixtures of natural gas and hydrogen offers a unique and cost-effective opportunity to initiate the progressive introduction of hydrogen prior to the development of a full hydrogen system. The aims of NaturalHy are to test all the critical components by adding hydrogen to natural gas in existing networks. This transitional approach will provide further experience with the transmission of mixtures of hydrogen and natural gas and, by means of innovative separation technologies, the utilisation of hydrogen in stationary end-use applications.

A systematic and coordinated approach for the generation of clear outcomes will be adopted in NaturalHy, with a comprehensive collection of work packages focusing on all vital components of transitional hydrogen systems. A schematic view of the project is given in *Figure 1*.

A European consortium of 39 partners with extensive experience and skills has been assembled for NaturalHy, which involves major network operators, hydrogen producers, specialist practitioners and academic researchers in all relevant fields. Potential collaboration and synergies will be fostered with complementary projects also receiving support from the European Union such as HyWays (a project to create the instruments for establishing a European hydrogen energy roadmap) and HySafe (a project concerned with the safety of hydrogen as an energy carrier).

A strategic advisory committee has been set up to establish a platform for the dissemination of information and the development of public awareness and understanding. It has a wide range of international representatives including IGU (represented by Dr Bob Harris), IEA, the UK Health and Safety Executive, ministries of economic and environmental affairs, ENGVA, the Carbon Trust and the European Thematic Network on Hydrogen (HyNet), and is chaired by the Chairman

of the European Committee for Standardisation (CEN).

NaturalHy is financially supported by the European Union and the contract was set to be signed at presstime, although work on the project started on May 1. The project duration will be five years and the total budget will be more than €17 million, of which the EU will provide €11 million. Onno Florisson of Gasunie Research is coordinating the project.

### *Stanford University – Baker Institute study*

Natural gas has grown from a marginal fuel consumed in regionally disconnected markets to a fuel of choice for consumers seeking its relatively low environmental impact, especially for electric power generation. The Energy Forum of the James A. Baker III Institute for Public Policy (Rice University) and Stanford University's Program on Energy and Sustainable Development have embarked on a major study of the geopolitical impact of the transition to a gas-fed world.

The study utilises seven historical case studies on the special challenges of investing in large-scale, long-distance gas production and transportation infrastructures. These studies concentrate on countries that do not all have the long histories of cooperation and the stable legal and political environments that are often seen as essential to attracting private investors. The studies examine the factors that explain why these projects were built and why alternative projects stalled.

Simultaneous to the analyses of historical case studies, Rice University developed a dynamic spatial general equilibrium economic model to simulate the development of global gas markets between 2005 and 2030 in a way that is very similar to the study of the former WOC 9 as presented during WGC2003 in Tokyo. The model finds a schedule for the development of gas resources and transportation routes to satisfy consumer demands at least cost. It allows analysis of scenarios, for example to incorporate geopolitical considerations.

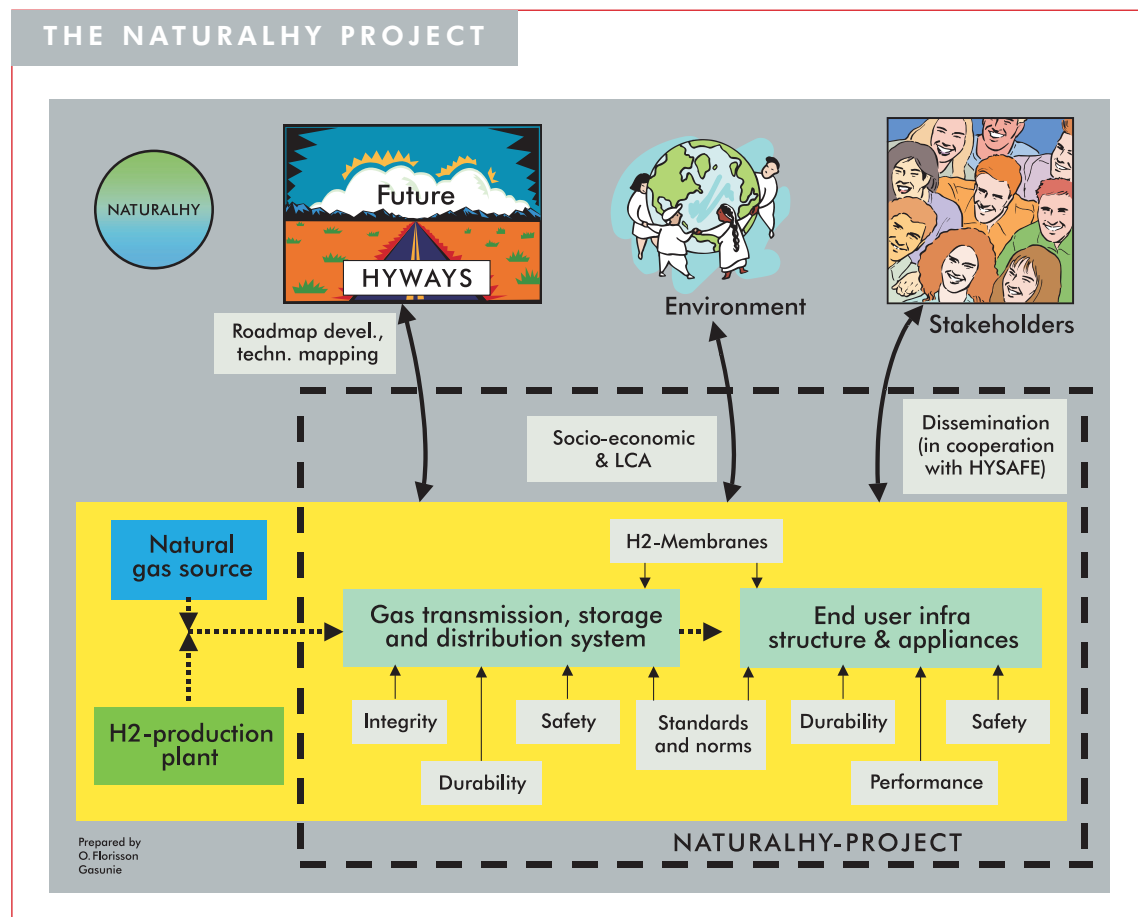


Preliminary study results were presented during an international conference held at Rice University, Houston (USA), May 26-27. The study findings so far include four broad conclusions:

- A more integrated global gas market will emerge, in which events in any individual region or country could affect all other regions.
- The role of governments, that has been central in creating markets for gas as well as in directing gas supply projects in the historical cases, will change considerably in the coming decades: away from builder, operator and financier of gas projects and toward a greater role as regulator and creator of the context for private investment.
- The rising geopolitical importance of natural gas implies growing attention to supply security.

- The rapid shift to a global gas market is not a certainty. It depends enormously on creating the context in which investors will have confidence to deploy vast sums of financial and intellectual capital. Second, developers of gas resources may run afoul of afflictions that often get the label "resource curse". Third, gasification may also run afoul of difficulties in siting major gas infrastructures, especially amid emerging worries about terrorism. And finally, the conventional wisdom that gas is favoured for electricity may not last where gas-fired generation is not the assumed low marginal cost supplier or cannot take advantage due to tighter environmental rules. More details can be found at <http://pesd.stanford.edu> or [www.bakerinstitute.org](http://www.bakerinstitute.org). Final study results will be reported later this year.

RIGHT  
Figure 1.



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

# Gastronomy

Norway's offshore gas riches are stimulating European appetites. Master chefs know that the best dishes are conjured forth over a gas hob. But Norwegian gas can be used for much more than cooking in restaurants and millions of European homes. Other applications include industry, electricity generation, fertiliser production and domestic heating.

Statoil is the biggest supplier of Norwegian natural gas to the rest of Europe. As the European gas market expands, so does Statoil. Bon appétit!



Statoil ASA. N-4035 Stavanger, Norway. Tel. +47 51 99 00 00. Fax +47 51 99 00 50. [www.statoil.com](http://www.statoil.com)





## Annex

### ● Milestones and deliverables

#### Progress reports

- 2004 second half year  
December 31, 2004
- 2005 first half year June 1, 2005
- 2005 second half year  
December 31, 2005
- 2006 first half year May 1, 2006

#### Papers and reports

- *March 1, 2005*  
Publication of call for papers
- *September 1, 2005*  
Deadline for abstract submission and for the names of invited speakers
- *October 1, 2005*  
Paper selection ready, authors to be notified
- *February 1, 2006*  
Deadline for paper submission (including invited speakers) and for the submission of the committee reports

#### Presentations

For each meeting of the CC each Committee has to prepare a 10-minute PowerPoint presentation on the progress of its work. This should be available on the Collaboration Portal one week before the meeting date, together with a short (one A4 page) progress report.

- *April 8, 2005*  
Deadline for Warsaw Meeting
- *October 10, 2005*  
Deadline for Tianjin City meeting
- *March 3, 2006*  
Deadline for Goa meeting  
Presentations for the World Gas Conference in Amsterdam must be

handed in at the authors' room the day before the session date at the latest.

### ● Addresses

Mr Bert Panman  
IGU Coordination Committee  
Chairman  
Director Special Projects,  
N.V. Nederlandse Gasunie,  
Gastransport Services  
P. O. Box 19, 9700 MA, Groningen,  
The Netherlands  
Telephone: +31 50 521 3284  
Fax: +31 50 521 1943  
E-mail: e.panman@gasunie.nl

Mr Roberto Brandt  
IGU Coordination Committee Vice  
Chairman  
CEO, MetroGAS S.A.  
G. Aráoz de Lamadrid 1360, 3°  
(1267 AAB) Buenos Aires, Argentina  
Telephone: +54 11 4309 1400  
Fax: +54 11 4309 1447  
E-mail: rbrandt@metrogas.com.ar  
PA: scowan@metrogas.com.ar

Mr Rob Aptroot  
IGU Coordination Committee  
Secretary  
N.V. Nederlandse Gasunie,  
Gastransport Services  
P. O. Box 19, 9700 MA, Groningen,  
The Netherlands  
Telephone: +31 50 521 3047  
Fax: +31 50 521 1943  
E-mail: rob.aproot@wgc2006.nl

Mr Peter K. Storm  
IGU Secretary General  
P. O. Box 550

c/o DONG A/S  
Agern Allé 24-26  
DK-2970 Hørsholm, Denmark  
Telephone: +45 45 17 13 66  
Fax: +45 45 17 19 00  
E-mail: pks@dong.dk

Ms Lisbeth Koefoed  
IGU Secretariat  
P. O. Box 550  
c/o DONG A/S  
Agern Allé 24-26  
DK-2970 Hørsholm, Denmark  
Telephone: +45 45 17 12 00  
Fax: +45 45 17 19 00  
E-mail: secr.igu@dong.dk

Dr Colin D. Lyle  
Working Committee 1 Chairman  
Director of European Policy  
Centrica Energy  
Millstream, Maidenhead Road,  
Windsor, Berkshire SL4 5GD,  
United Kingdom  
Telephone: +44 1753 431172  
Fax: +44 1753 431040  
E-mail: colin.lyle@centrica.co.uk

Dr Sergei A. Khan  
Working Committee 2 Chairman  
Head of UGS Direction OAO,  
GAZPROM  
65, Novocheremushkinskaya str.,  
Moscow 117418, Russia  
Telephone: +7 095 719 2954  
Fax: +7 095 719 4761  
E-mail: S.Khan@adm.gazprom.ru

Mr Juan A. Diez de Ulzurrun  
Working Committee 3 Chairman  
General Director Sociedad de Gas  
de Euskadi  
Plaza Pio Baroja, 3-21  
48001 Bilbao, Spain  
Telephone: +34 944 355673  
Fax: +34 944 238057





E-mail: juanandres.ulzurrun@  
naturgas.es

Mr Peter A. Cistaro  
Working Committee 4 Chairman  
Vice President, Gas Delivery Public  
Service Electric & Gas Co  
80 Park Plaza, P. O. Box 570, T-14  
Newark, New Jersey 07101, USA  
Telephone: +1 973 430 5100  
Fax: +1 973 430 7826  
E-mail: peter.cistaro@pseg.com

Mr Marc Florette  
Working Committee 5 Chairman  
R&D Vice President, Gaz de France  
361, avenue du President Wilson, BP  
33 93211, St-Denis la Plaine Cedex,  
France  
Telephone: +33 1 49 22 50 59  
Fax: +33 1 49 22 49 49  
E-mail: marc.florette@  
gazdefrance.com

Mr Daniël Arias  
Programme Committee A Chairman  
HSE Manager,  
Pan American Energy LLC  
Leandro N. Alem 1180, Piso 11,  
C1001AAT Buenos Aires, Argentina  
Telephone: +54 11 4310 4394  
Fax: +54 11 4510 3815  
E-mail: darias@pan-energy.com

Dr Klaus-Robert Kabelitz  
Programme Committee B Chairman  
E.ON Ruhrgas AG  
Huttropstraße 60  
45138 Essen, Germany  
Telephone: +49 201 1843440  
Fax: +49 201 1843824  
E-mail: klaus-robot.kabelitz@  
ruhrgas.com

Mr Camillo Michele Gloria  
Programme Committee C Chairman

Senior Vice President International  
Development and Trading  
Eni SpA Gas & Power Division  
Piazza Vanoni 1, 20097 S.Donato  
Milanese, Italy  
Telephone: +39 02 5203 1628  
Fax: +39 02 5205 1293  
E-mail: camillo\_michele.gloria @eni.it

Dr Chawki Mohamed Rahal  
Programme Committee D Chairman  
Director General, Sonatrach  
Petroleum Corporation  
5, Princes Gate, London SW7 1QJ,  
United Kingdom  
Telephone: +44 20 7823 8030  
Fax: +44 20 7589 9894  
E-mail: pgcd@sonatrach.co.uk

Mr Roy Bilbé  
Chairman of Task Force R&D  
N.V. Nederlandse Gasunie  
Energieweg 17, P.O. Box 19,  
9700 MA, Groningen,  
The Netherlands.  
Telephone: +31 50 521 2547  
Fax: +31 50 521 1946  
E-mail: r.m.bilbe@gasunie.nl

Mrs Véronique Durand-Charlot  
Chairwoman of Task Force ICT  
Deputy Vice President Procurement &  
IT, Gaz de France  
Courcelot 1 Building 2, rue  
Curnonsky, 75017 Paris, France  
Telephone: +33 1 47 54 23 66  
Fax: +33 1 47 54 25 56  
E-mail: veronique.durand-  
charlot@gazdefrance.com

Mr Rene Snijder  
Project Leader Special Project  
Regulation  
N.V. Nederlandse Gasunie  
P. O. Box 19, 9700 MA Groningen,  
The Netherlands

Telephone: +31 50 521 2300  
Fax: +31 50 521 1943  
E-mail: r.snijder@gasunie.nl

Mr Ulco Vermeulen  
Project Leader Special Project  
Sustainability  
N.V. Nederlandse Gasunie  
P. O. Box 19, 9700 MA Groningen,  
The Netherlands  
Telephone: +31 50 521 2902  
Fax: +31 50 521 1941  
E-mail: u.vermeulen@gasunie.nl

Mr Dick de Jong  
Project Adviser Special Project  
Gas to Power  
Fellow of the Clingendael Institute  
Energy Programme  
Clingendael 7a, P. O. Box 93080,  
2509 AB Den Haag,  
The Netherlands.  
Telephone: +31 70 324 7724  
Fax: +31 70 374 6688  
E-mail: dj.dejong@wxs.nl

Mr Robert C. A. Doets  
Chairman of NOC – WGC 2006  
Secretary General of the KVGN  
P. O. Box 20051,  
7302 HB Apeldoorn,  
The Netherlands  
Telephone: +31 26 356 6345  
Fax: +31 26 356 6346  
E-mail: secr.kvgn@kvgn.nl

Mrs Mariska van der Veen  
Project Leader of WGC 2006  
Eurocongres Conference  
Management  
Jan van Goyenkade 11, 1075 HP  
Amsterdam,  
The Netherlands  
Telephone: +31 20 679 3411  
Fax: +31 20 673 7306  
E-mail: veen@eurocongres.com

# SUEZ, A SMART GAS STRATEGY

SUEZ starts with one advantage over most other global energy companies: it is involved in both gas and electricity supply and distribution; and it can also provide a range of other value-added services such as consultancy, engineering, management and maintenance. As far as natural gas is concerned, SUEZ operates in almost all parts of the gas supply chain, apart from exploration and production: supply contracts, gas processing and transportation, gas storage, gas marketing and gas trading (wholesale and retail).

SUEZ recognised at an early stage the increasingly complementary nature of the gas and electricity markets, and moved to establish a business model that would extract the maximum value from it. The various parts of the Group operate a unified business model that works by integrating electricity and gas operations around a central portfolio management. The model aims to match the available supply to demand, balancing assets (long positions) with sales (short positions). Central portfolio management optimises fuel supply, generation, origination and

sales activities. Trading, the link to the wholesale energy markets, is used to keep this balance finely tuned. In this way gas and electricity are brought close together which means their full potential can be realised.

Distrigas, Fluxys and Electrabel for example form a trio of companies that together constitute SUEZ's European natural gas operations. Distrigas is a supplier of natural gas to some of Electrabel's power stations in Europe. Both Electrabel and Distrigas trade energy as a means of adjusting supply to demand and achieving the best possible price for customers. Fluxys completes the picture by offering gas transport and storage facilities in Belgium, while operating Zeebrugge Hub, the largest spot market for natural gas in continental Western Europe.

This model is reflected in SUEZ's worldwide LNG operations too. For example, the Group has established a strong position in the LNG sector through three of its subsidiaries – Tractebel Global

LNG, Tractebel LNG North America and Distrigas. Here again, it uses its strength in this market to balance supply and demand, thus ensuring competitive prices and stability of supply.

SUEZ strives for absolute mastery of art, and in all aspects of its business provides all the necessary value-added services. Its subsidiary Tractebel Gas Engineering for example is recognised as one of the leading specialists in the design and construction of plants for the handling of gas (LNG and LPG) from well-head to storage throughout the gas chain.

To summarise, it is SUEZ's unique combination of skills and expertise across the full spectrum of the natural gas and electricity business, and its proven ability to harness these in an effective and efficient business model, which has been the driving force behind the company's success even in today's difficult energy markets.

**SUEZ, THROUGH ITS TRACTEBEL BRAND, IS INVOLVED IN THE COMPLETE GAS-SUPPLY CHAIN, AFTER EXPLORATION AND PRODUCTION. THIS DIVERSITY ENABLES COMPANIES SUCH AS DISTRIGAS, FLUXYS, TRACTEBEL GAS ENGINEERING, TRACTEBEL GLOBAL LNG OR TRACTEBEL LNG NORTH AMERICA LLC TO DEVISE CUSTOM SOLUTIONS IN RESPONSE TO THE NUMEROUS CHALLENGES FACING ANY BUSINESS ENTERPRISE OR PUBLIC AUTHORITY.**

## DISTRIGAS

Distrigas is a Belgian natural gas and LNG sales company. With more than 75 years experience in Europe, Distrigas has always developed a real partnership with its customers: industries, distribution companies and electricity producers.

## FLUXYS

Fluxys operates the Belgian gas transmission network and storage facilities. Its subsidiary Huberator operates the Zeebrugge hub. Fluxys LNG owns and operates the Zeebrugge LNG terminal.

## TRACTEBEL GAS ENGINEERING

Tractebel Gas Engineering is one of the world's leading engineering contractors for the storage, transportation and conditioning of LNG, LPG and petrochemical gases. The company offers high-value engineering by means of its core competence in turnkey contracting.

## TRACTEBEL GLOBAL LNG

Based in London, Tractebel Global LNG Ltd. operates worldwide to lead the expansion of the SUEZ Group's LNG business activities focusing on both Atlantic and Pacific markets, promoting new LNG ventures, trading LNG spot cargoes, and coordinating

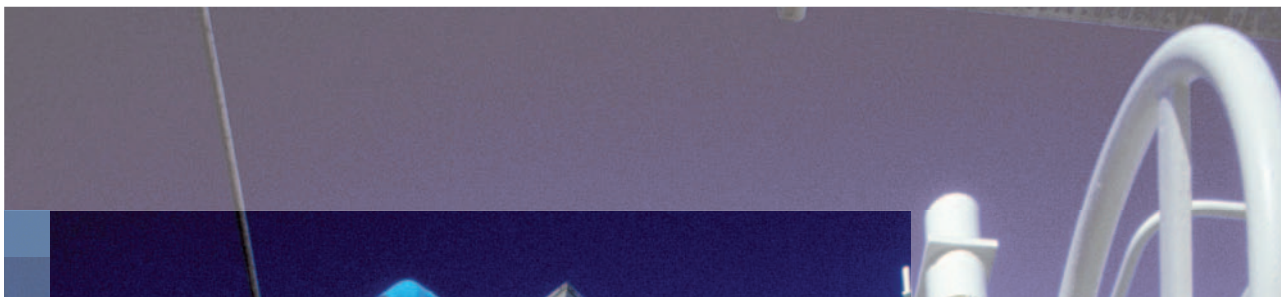
the Group's supply and shipping portfolio. In addition, TGLNG manages the company's 10% equity stake in Atlantic LNG, a major liquefaction plant based in Trinidad and Tobago.

## TRACTEBEL LNG NORTH AMERICA LLC

Tractebel LNG North America, is the leading importer and most experienced LNG terminal operator in North America, making deliveries to the facility it owns and operates in Everett, Massachusetts since 1971 and, in cooperation with Tractebel Global LNG, to LNG facilities in Puerto Rico, Louisiana, Georgia and Maryland. The company currently controls four LNG carriers.



# SVEZ



**Tractebel**

EXPERTS IN NATURAL GAS



photography: Emmanuel Manderlier





# Be the best you can be

TOGETHER WE CAN ACHIEVE MORE.

In business, the world is constantly changing. The most successful organisations around learn from others in order to stay ahead. They actively seek people who bring new knowledge and process to the way in which they currently operate.

At Shell Global Solutions we want to share our knowledge and operating experience. We will work with you to develop strategies to achieve your business objectives. We'll devise implementation plans that best suit your organisation. And we'll stay with you until you see results.

## The next step..

BENCHMARKING

OPERATIONAL EXCELLENCE

MARGIN IMPROVEMENT

RELIABILITY & MAINTENANCE

ENERGY OPTIMISATION

TECHNOLOGY LICENSING

PROJECT MANAGEMENT

IMPLEMENTATION SUPPORT

CHANGE MANAGEMENT

For further information please

email us at [shellglobalsolutions@shell.com](mailto:shellglobalsolutions@shell.com)

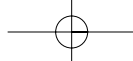
or call us on **+31 70 377 2470** (Europe)

or visit our website at [www.shellglobalsolutions.com](http://www.shellglobalsolutions.com)



## Shell Global Solutions

Shell Global Solutions is a network of independent technology companies in the Royal Dutch/Shell Group



## FEATURES

**This issue's feature section contains an overview of LNG-14, a report on gas developments in the Americas, a focus on WOC 1 (exploration and production), a look at the benefits of being an IGU Associate Member and a preview of IGRC-2004. Then we have the latest update on preparations for the 23rd World Gas Conference. We round up with a description of the publications and documents available from IGU and an events calendar.**





# LNG-14 in Qatar – An Emphasis on Liquefaction Plant Design

By David Roe

The 14th International Conference and Exhibition on Liquefied Natural Gas (LNG-14) took place in Doha, Qatar, March 21-24. It was hosted and well organised by Qatar Petroleum. There were 2245 delegates, a record number for this triennial series of conferences sponsored by IGU, the International Institute of Refrigeration (IIR) and the Gas Technology Institute (GTI). The impressive exhibition, managed by Exhibitions and Trade Fairs of Australia, was the largest ever with 14,000 square metres of space and 152 exhibiting companies.

### ● Keynote speeches

In the first keynote speech, the Minister of Energy and Industry, H. E. Abdullah Bin Hamad Al Attiyah,

outlined Qatar’s ambitious plans to be the world’s largest LNG exporter, with 60 million tonnes per annum (mtpa) by 2010, compared with 18 mtpa today. Dr Chakib Khelil, Algerian Minister of Energy and Mines, gave a strong warning about the continued need for long-term LNG sales contracts to underpin the heavy investment in new LNG supply projects. Mr Claude Mandil, Executive Director of the International Energy Agency, predicted a six-fold growth in LNG trade over the next 30 years. However, he pointed out that to make this happen the LNG industry faced many challenges.

### ● LNG trade and markets

The conference heard how fast the LNG trade is changing. Ann Pickard of Shell described the role of “demand and supply aggregators”: major companies with a portfolio of LNG supplies, market outlets and ships, who facilitate new LNG trade. Jeaseoung Choi of Korea Gas Corporation indicated how several recent LNG supply deals in Asia had set price levels that were some 20% lower than before, with less price indexation to oil. Tetsu



H. H. Sheikh Hamad Bin Khalifa Al-Thani, Emir of Qatar, opens LNG-14.





Hashimoto of Tokyo Electric described how his company had procured more LNG in 2003 at short notice because of the unexpected temporary shutdown of nuclear power plants. This showed the need for greater flexibility in Asian LNG supply contracts to help cope with short-term demand variations.

US LNG demand is growing fast, but as gas prices remain high there was a possibility of "demand destruction". Several speakers stressed that to be successful in supplying LNG a full understanding was necessary of the complexities of trading in US and European markets and the regulatory issues. James Ball of Gas Strategies Consulting concluded that the North American West Coast market was unlikely to provide arbitrage opportunities with respect to the Asian market: rarely will prices exceed those in Asia by sufficient to compensate for the extra costs of shipping LNG from Asia to North America.

Yves Bramouille of Total presented an interesting paper on LNG quality. Some LNG supply sources in Africa and the Middle East produce a "rich" LNG, which although suitable for markets in Asia and the continent of Europe, exceeds the specified maximum calorific value for the UK and USA. Reception terminals in the UK and USA may have a commercial incentive to install nitrogen dilution or LPG extraction facilities, so that they can receive LNG from anywhere; alternatively the liquefaction plants may produce two grades of LNG: one for the UK/USA market, and one for elsewhere.

#### ● Liquefaction technologies

Much of LNG-14 was taken up with presentations of the major efforts being spent to improve project feasibility, through use of larger capacity liquefaction trains to achieve economies of scale. In a Workshop Session, however, the Panel stressed that the train size had to be "fit for purpose": cost savings were lost if there was a prolonged period while LNG sales built up to match the plant capacity.



H. E. Abdullah Bin Hamad Al-Attiyah, Qatar's Second Deputy Prime Minister and Minister for Energy & Industry, opens the LNG-14 exhibition.

Andrew Jamieson of Nigeria LNG described the train 4 and 5 expansion of Nigeria LNG's plant (under construction); each train of 4.1 mpta capacity uses the widely-used Air Products (AP) propane pre-cooled mixed refrigerant process (C3-MR), with air cooling and two GE Frame 7 gas turbine drivers. Don Hill of Kellogg, Brown and Root presented the Egyptian SEGAS LNG export project, now under construction, which will increase train capacity to 5 mpta using a variant on this process, with AP's Split MR refrigerant compression configuration.

The first to challenge the C3-MR process in recent years was Phillips' enhanced cascade process, as used in the Atlantic LNG Trinidad plant. Phil Hunter of Bechtel described train 4, claimed at 5.2 mpta to be the largest under construction. Doug Yates of ConocoPhillips described the 3 mpta Darwin plant in Australia, now under construction, which uses the same process, and will be the first to use aero-derivative gas turbine drivers, which have a higher thermal efficiency than industrial gas



The exhibition was the largest ever with 152 companies taking stands.

turbines. Andy Calitz of Sakhalin Energy presented the Russian Sakhalin II LNG plant, with two 4.8 mta trains under construction. It will use the new Shell Double Mixed Refrigerant Process, which has mixed refrigerant in both the pre-cooling and the main cooling cycle.

Roy Scott Heiersted of Statoil described the Snøhvit project, Norway – an LNG plant under construction that has placed a major emphasis on greenhouse gas emission reductions. It uses CO<sub>2</sub> reinjection offshore and will also be the first electric motor-driven LNG plant, with power generated by aero-derivative gas turbines. It is the first application of the Statoil-Linde Mixed Fluid Cascade process. Richard Jones of BP presented a study (BP's Big Green Train) of lower-cost, efficient, low-emission electric motor-driven plant designs. In a Workshop Session it was stated that one big advantage of electric motor-driven plant is that they decouple the selection of the gas turbine driver from the refrigerant compressor and create more competition among equipment suppliers – which should drive down costs. More vendors are

able to bid to supply combined cycle power plants producing the power for such plants.

Several papers were presented that described studies of super-large liquefaction trains of 7.5 mpta capacity or more. Marc le Metais of Total outlined the problem in scaling up the AP C3-MR process. Propane compressors were close to their technological limits, and the largest main heat exchanger that AP can make in their current workshops is suitable for only 5 mpta capacity. Mark Roberts of Air Products described one solution, the AP-X process, which adds a third refrigeration cycle – a nitrogen expander, offloading the other two cycles, allowing them to use compressors and exchangers of proven size. Grant Thompson of Qatargas II presented an overview of the project, which is at the design stage: each of the two 7.8 mpta trains will use the AP-X process. The members of the design team have satisfied themselves that larger GE Frame 9 gas turbines can be used. However, J. Pek of Shell Global Solutions noted that Shell is cautious about adopting the untried Frame 9 drivers. He described the development of a