International Gas October 2015 – March 2016

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International Gas

OCTOBER 2015 - MARCH 2016

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Vision and Mission

The International Gas Union (IGU) is a worldwide, nonprofit organization promoting the progress of the gas industry. Through its many member countries representing approximately 97% of global gas sales, IGU covers all aspects of the gas industry.

The IGU Vision and Mission were recently redefined to reflect changes in the global gas markets and the growth of the organization in recent years. The new Vision and Mission – approved at the IGU Council meeting in Paris, France, June 1, 2015 – reflect IGU's Building for the Future outreach initiative and aim at making IGU a more proactive, focused and effective advocate for the global gas industry. With the changes, focus is moved towards IGU as the Global Voice of Gas and emphasis put on the fact that natural gas is a key contributor to people's lives and futures.

Vision

As the global voice of gas, IGU seeks to improve the quality of life by advancing gas as a key contributor to a sustainable energy future.

Mission

- IGU is the key and credible advocate of political, technical and economic progress of the global gas industry, directly and through its members and in collaboration with other multilateral organizations.
- IGU works to improve the competitiveness of gas in the world energy markets by promoting transparency, public acceptance efforts and the removal of supply and market access barriers.
- IGU seeks to collaborate with governmental agencies and multilateral organizations to demonstrate the economic, social and environmental benefits of gas in the global energy mix.
- IGU supports and facilitates the development of new technologies and best practices, while emphasizing sound environmental performance, safety, reliability and efficiency across the entire value chain.
- IGU maximizes the value of its services to members and other stakeholders.



Gas Natural Fenosa and Sedigas, proud Hosts of the IGU Secretariat 2016-2022 Barcelona, Spain

Gas Natural Fenosa and Sedigas will be proud Hosts of the Secretariat of the International Gas Union for the 2016-2022 period. We are committed to promoting the gas industry around the world, with flexibility and proximity. Based in Barcelona, a strategic location in the natural gas market and a pioneering city in the use of this energy. Welcome.



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IGU

Message from the President and the Secretary General

Dear Colleagues

Welcome to this edition of the IGU magazine, and welcome to IGU's new Triennium!

When we last saw each other this past June, we were concluding the World Gas Conference – WGC 2015 – in Paris. What a wonderful week it was! Leaders from industry, academia and policymakers from around the world gathered to share their visions, ideas, new products and practices that will shape the global gas industry for years to come.

We congratulate past president Jérôme Ferrier and the entire French team for a job well done. Under their leadership, IGU's membership roster grew, the Union was established as the Global Voice of Gas, and plans to refocus its mission were put into motion.

 David Carroll, President and Pål Rasmussen,

Secretary General.



Your new IGU management team is committed to building a stronger, more influential Union – one that drives advances in our global industry while serving its members exceptionally well. The times demand it, and our members expect it. Be confident that you have in place a leadership team that will work tirelessly on your behalf, respecting, of course, the history and traditions of IGU, but adapting the organization to meet the challenges of the future.

Challenges and opportunities

Since June, the energy world has kept turning. Challenges and opportunities abound. Global gas pricing variations, new supply sources coming on line, heightened concerns about climate change, expanded penetration of renewable energy technologies and the ever-growing thirst for energy from expanding economies.

We believe, as many of you do, that gas offers a pathway to economic prosperity and responsible environmental stewardship.

We're already working hard to deliver on the key objectives of our presidency – expanding access to gas worldwide, growing end markets and enhancing the public's confidence in our industry. We'll pursue every opportunity to advocate for gas in the global energy debate – by developing positions based on objective, sound science and communicating them clearly and effectively to global policy makers.

An example of this is the upcoming climate change conference, COP 21, in Paris this December. In the run up to COP 21, the conference parties will attempt to establish binding targets that reduce greenhouse gas emissions. IGU will be present in Paris with a message: gas represents the quickest, most





economical way to reduce carbon emissions and clean the air. We'll then focus on helping countries meet their commitments with gas as part of the solution.

But we need your help. IGU is fortunate to have access to thousands of energy professionals worldwide committed to serving our fellow citizens faithfully and responsibly every day, 24-7. Join your fellow professionals in the IGU committees and task forces this Triennium to further IGU's mission and contributions, while at the same time, increasing your knowledge and network in the global gas industry. Our committees span the gas value chain – their output will make a difference.

We have a lot of work to do. The clock is ticking. So let's get going! With best regards

David and Pål



✓ WGC 2015 in Paris was a great success. (LEFT) In a dramatic closing ceremony, (LEFT, BELOW) the USA took over for the 2015-2018 Triennium.

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66

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Our size and global reach are important. But we believe that ultimately success comes from the energy of our people and the strength of the relationships we build.







Adding value right across the supply chain

IGU

Albania Algeria Angola Argentina Armenia Australia Austria Azerbaijan Bahrain Belarus Belgium Bolivia Bosnia and Herzegovina Brazil Brunei Bulgaria Cameroon Canada Chile

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Every day the world needs more energy. Oil alone won't be enough. So we're investing in the responsible development of abundant, cleaner-burning natural gas. Off the coast of Western Australia, Chevron is developing two of the largest natural gas ventures in the world. Our commitment to projects like these is making the potential of natural gas a reality.

Please see how we are leading the way in natural gas development at the Gastech Conference at Hall #4, Booth Space 22, Oct. 27-30 in Singapore.



Charter Members

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APPEA (Australia)	Liander N.V. (The Netherlands)	
Beijing Gas Group (China)	N.V. Nederlandse Gasunie (The Netherlands)	
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BP Gas Marketing Ltd (United Kingdom)	Origin Energy Limited (Australia)	
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Bursagaz (Turkey)	Petronet LNG Limited (India)	
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DNV GL (Norway)	Shell International Exploration & Production B.V. (The Netherlands)	
Enagás (Spain)	Société Suisse de l'Industrie du Gaz et des Eaux – SSIGE/SVGW	
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ENGIE (France)	Sonorgás (Portugal)	
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Eurogas	TBG – Transportadora Brasileira Gasoduto Bolívia-Brasil S.A. (Brazil)	
ExxonMobil Gas & Power Marketing (USA)	TgP – Transportadora de Gas del Perú (Peru)	
Gaslink – Gas System Operator Ltd (Ireland)	TOTAL S.A. (France)	
GasTerra B.V. (The Netherlands)	Vopak LNG Holding B.V. (The Netherlands)	
GAZBIR – Association of Natural Gas Distributors of Turkey	Westnetz GmbH (Germany)	
IGDAŞ – Istanbul Gas Distribution Co. (Turkey)	Wintershall Holding GmbH (Germany)	
Indian Oil Corporation Ltd (India)	Woodside (Australia)	
Indonesian Gas Society (Indonesia)		

Organisations Affiliated to IGU

Energy Delta Institute (EDI)	NGVA Europe – European Association for Bio/Natural Gas Vehicles		
Gas Infrastructure Europe (GIE)	International Pipe Line & Offshore Contractors Association (IPLOCA)		
Gas Technology Institute (GTI)	MARCOGAZ – Technical Association of the European Natural		
GERG – Groupe Européen de Recherches Gazières/European Gas Research Group	Gas Industry		
	Pipeline Research Council International, Inc. (PRCI)		
GIIGNL – Groupe International des Importateurs de Gaz Naturel	Russian National Gas Vehicle Association (NGVRUS)		
Liquéfié/International Group of LNG Importers	World LPG Association (WLPGA)		
NGV Global			



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IGU Organization 2015–2018



IGU Executive Committee

Mr Fethi Arabi, Algeria	Mr Gerald Linke, Germany	Mr Rur Norwa
Mr Javier Gremes Cordero,	Mr Hedayat Omidvar, Iran	Mr Abo Al-Hus Qatar
Argentina	Mr Andrea Stegher,	
Ms Cheryl Cartwright,	Italy Mr Kyoji Tomita,	Mr And
Australia		Russiar
Mr Augusto Salomon,	Japan	Mr An
Brazil	Mr Jae Ho Song,	Spain
Ms Lixin Che, China, People's	Korea, Republic of	Mr Day
	Dr Gi Chul Jung, Korea, Republic of	United
Republic of		Mr Me
Mr Eduardo Pizano, Colombia	Mr Pramod Kumar Karunakaran,	Ydreos United
Mr Andreas Rau,	u, Malaysia Mr Gertjan Lankhorst,	Mr Jea
Czech Republic		Associa
Mr Jérôme Ferrier,	Netherlands, The,	ENGIE
France	Regional Coordinator Europe	

Mr Runar Tjersland, Norway
Mr Abdulla A. Al-Hussaini, Qatar
Mr Andrey Sapozhnikov, Russian Federation
Mr Antoni Peris Mingot, Spain
Mr David Carroll, United States of America
Mr Menelaos (Mel) Ydreos, United States of America
Mr Jean-Michel Figoli, Associate Member, ENGIE

Ms Cynthia Silveira, Associate Member, IBP Mr Youngsik Kwon, Associate Member, KOGAS Ms Yenni Andayani, Associate Member, Pertamina Mr Chris Gunner, Associate Member, Shell Ms Li Yalan, Regional Coordinator Asia and Asia-Pacific Mr Khaled Abubakr, **Regional Coordinator** Middle East and Africa Mr Timothy M. Egan, **Regional Coordinator** North America

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Mr Marcel Kramer,
Regional Coordinator
Russia, Black Sea and
the Caspian area
Mr Pål Rasmussen,
Secretary General
Mr Luis Bertrán Rafecas,
Deputy Secretary
General
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IGU Management Team



Mr David Carroll, President (United States of America)



Mr Menelaos (Mel) Ydreos, Chair of the Coordination Committee (United States of America)



Mr Pål Rasmussen, Secretary General



Mr Jae Ho Song, Vice President (Republic of Korea),

IGU Secretariat



Dr Gi Chul Jung, Vice Chair of the Coordination Committee (Republic of Korea)



Mr Luis Bertrán Rafecas, Deputy Secretary General



Mr Jérôme Ferrier, Immediate Past President (France)



• Working with Pål Rasmussen in the IGU Secretariat are: (from left to right in the front row) Taeksang Kwon, Advisor; Anette Sørum Nordal, **Information Consultant** and Secretary of the Coordination Committee; Kristin Sande, Administration Consultant; (from left to right in the back row) Torstein Indrebø, Honorary Secretary General; Sjur Bøyum, Senior Advisor; and Mats Fredriksson, Director.



YEMEN LNG

Delivering Energy To The World



In November 2014, Yemen LNG marked the 5th anniversary of the first LNG cargo export followed by steady shipments to more than 15 countries in the Americas, Asia and Europe.

Key Milestones

JAN 1995

Yemen LNG established

MAR 1997

Yemeni Parliament ratifies the Gas Development Agreement

AUG 2005

Yemen LNG signs sales & purchase agreements with KOGAS, GDF-Suez and Total Gas & Power Ltd

SEP 2005

Construction of the plant and pipeline begins

MAY 2008

Yemen LNG signs \$2.8 billion of project financing

MAY 2008

Yemen LNG completes 320km gas pipeline construction from Marib fields to Balhaf

NOV 2009

Yemen LNG exports its first cargo of liquefied natural gas

JUN 2010

Yemen LNG fully inaugurated, with both trains operating

NOV 2012

Yemen LNG successfully achieves Lenders' Completion from its project financing consortium



YEMENLNG.COM

News from the Presidency and Secretariat

The main activities of the IGU Presidency and Secretariat since the last issue of the IGU Magazine (April-September 2015) are detailed below in news items and general information.

Strategic partnerships

After the redefinition of IGU's Vision and Mission at the Council meeting in Paris, France on June 1, collaboration with other multilateral organizations has become an integral part of the Union's advocacy work. IGU continues to increase strategic cooperation with other international organizations in order to enhance its position as the Global Voice of Gas.

Since the last issue of this magazine, four new Memorandums of Understanding (MoU) with international organizations have been signed – all of which give IGU excellent oppotunities to reach out to stakeholders in different areas and in different regions with its message on gas. The future energy debate is a holistic one taking into account sustainability and environmental factors, health concerns and economic and social factors. The different factors must all be reflected in IGU's work and the recently signed MoUs reflect this complexity.

The MoU with the International Peace Institute (IPI) was signed on the sidelines of the IGU meetings in Abu Dhabi, UAE in March. IPI is an independent international non-profit thinktank, dedicated to the promotion of the prevention and settlement of conflicts between and within states. The organization works to strengthen international peace and security institutions through a combination of policy research, convening, publishing and outreach. IGU and IPI have hosted several meetings together, and the objective of this MoU is to



IGU signed an MoU with UNECE in April. Seen from left to right are: Pål Rasmussen; Jérôme Ferrier; Christian Friis Bach, Executive Secretary and Under Secretary General, UNECE; and Scott Foster, Director Sustainable Energy Division, UNECE.





enhance existing cooperation on geo-strategic issues related to energy and security.

In April, the MoU with the United Nations Economic Commission for Europe (UNECE) was signed in Paris. Energy is one of UNECE's focus areas and IGU has long been UNECE's main partner on gas issues. The MoU builds on this existing cooperation with a view to increasing global access to affordable and clean energy for all, and will help raise awareness of the benefits that greater use of gas in the global energy mix can offer in providing access to affordable and clean energy.

The MoU with the United Nations Educational, Scientific and Cultural Organization (UNESCO) was signed in Paris in May. IGU and UNESCO organized a workshop on Women in Engineering in Africa and the Arab States in December 2013. The themes addressed are part of UNESCO's global priorities and also an emerging priority for IGU. Through the MoU, IGU and UNESCO have agreed to collaborate on projects and initiatives in Africa and the Middle East to enhance the participation of women in engineering.

The United Nations Environmental Programme (UNEP) is the leading organization within the United Nations system in the field of the environment. The MoU between IGU and UNEP was signed during WGC 2015 in Paris in June. UNEP will be a good partner for IGU in its work on climate, energy access and energy efficiency. The MoU's objective is to work to provide a framework of cooperation and understanding on these three areas, emphasizing sound environmental performance, safety, reliability and efficiency across the entire gas value chain.

G20 Energy Sustainability Working Group

IGU has the honour to continue its participation in the G20 Energy Sustainability Working Group (ESWG) under the Turkish G20 Presidency as one of the few international non-governmental organizations invited to attend the working group's meetings. The second meeting of the ESWG under the Turkish G20 Presidency took place in Istanbul, May 25-26, and IGU was represented by the Secretary General, Pål Rasmussen, and the incoming Chair of the Coordination Committee, Mel Ydreos. The meeting focused on access to energy for all, energy efficiency, market transparency, inefficient fossil fuel subsidies and renewable energy. IGU participated actively in the discussions and Pål Rasmussen shakes hands with Philip Swanson, Administrator of the CCAC Oil & Gas Methane Partnership to mark the signing of the IGU-UNEP MoU.

✓ Jérôme Ferrier shakes hands with UNESCO's Director General, Irina Bokova on the signing of the IGU-UNESCO MoU. UNESCO's Director Partnerships and Resource Mobilization, Vincent Defourny is in the background.



IGU



The second meeting of the ESWG under the Turkish G20 Presidency took place in Istanbul.



Kristin Sande.



Antonia Fernández
 Corrales.

delivered a report to the G20 group on natural gas as a partner for renewable energy.

New members

IGU's membership continues to grow. At the IGU Council meeting in Paris, two new Associate Members, Beijing Gas Group from China and Enagás from Spain, were approved. This brings IGU's total membership to 91 Charter Members and 53 Associate Members. *See pages 172-173* for short profiles of the new members.

Secretariat staff changes

Since March 2015, Kristin Sande has been the IGU Secretariat's Administration Consultant. Kristin is seconded from Statoil where she has worked since 2008 as a PA/administration consultant for several business units, including projects, communication and business development. She has previous experience with other companies in IT, shipping and oil and gas.

IGU is also pleased to announce that Antonia Fernández Corrales (Gas Natural Fenosa) will join the Secretariat in October 2015. She will work in Oslo and will continue her collaboration in Barcelona, Spain, making the transfer to the IGU Secretariat 2016-2022 hosted by Sedigas as Charter Member and by Gas Natural Fenosa as sponsor.

Antonia has 14 years of experience in the energy sector in different positions. She was responsible for the Chairman's office, has skills in economic planning and regulatory affairs and has been in charge of technical training in the company worldwide. She studied Economics and holds an Executive MBA from IESE. Antonia likes to work in international and multicultural environments and to learn from new professional contexts. In her free time she loves to travel and to practice photography.

IGU is very grateful to both Statoil and Gas Natural Fenosa for their kind support and wish Kristin and Antonia all the best for their secondments.

5th Gulf Intelligence Doha Energy Forum

The 5th Gulf Intelligence Doha Energy Forum took place in Doha, Qatar, March 10-11 The forum aims to facilitate a robust and intimate exchange of knowledge between

Natural Gas Sector Meets in INGAS

11-12 November 2015, Istanbul



GBR 186N

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The 6th International Gas Symposium will be held in Istanbul on 11-12 November 2015.

IGDAS welcomes all industry stakeholders to Istanbul in 2015 to the $6^{\rm th}\,\rm INGAS$ 2015!



Photograph by Figen Çiftçi



STANBUL METROPOLITAN MUNICIPALITY



▲ Diplomas were presented to members of the Executive Committee at their last meeting of the 2012-2015 Triennium in Abu Dhabi. the principal stakeholders responsible for the stewardship of the Qatar energy industry. IGU was represented by the then President, Jérôme Ferrier who participated in a panel on the energy outlook for Asia and in a session on LNG.

2nd NGVA Europe Regional Seminar

The 2nd NGVA Europe Regional Seminar was held by IGU affiliated organization NGVA Europe in Helsinki, Finland on March 17. Mats Fredriksson, Director, attended the event on behalf of IGU. The seminar focused on LNG and CNG for transport and he gave a presentation on gas as a sustainable transportation fuel.

UNESCO Council

Jérôme Ferrier was invited to address the UNESCO Council on March 19 in Paris, France. He gave a presentation on the role of natural gas in sustainable development.

CC and EXC meetings in Abu Dhabi

ADNOC Distribution hosted the last Coordination Committee (CC) and Executive Committee (EXC) meetings of the 2012-2015 Triennium in Abu Dhabi, UAE, March 24-26.

The Executive Committee meeting made important decisions regarding the Building for

the Future project and the incoming Korean Vice President, Jae Ho Song was introduced. He gave a presentation in which he assured delegates of Korea Gas Union's continued support for IGU.

The theme of the Executive Committee workshop was "Gas and Renewables". The workshop included interesting presentations from the International Renewable Energy Agency (IRENA), GTI, UNEP and Total in Abu Dhabi. IGU's then Vice President, David Carroll, spoke in his role as President and CEO of GTI about options to reduce greenhouse gas emissions through the use of biofuel and biogas. Ruud Kempeneer, Technology Roadmap Analyst at IRENA, gave a presentation on gas and renewables saying that the share of renewables in the energy mix is growing and will continue to grow in the future, but that natural gas has an important complementary role to play. Philip Swanson, Administrator of the CCAC Oil & Gas Methane Partnership, looked at how companies can act to reduce methane and short-lived climate pollutants. The last speaker, Amer Al Shaikh Ali, CEO of Total Abu Dhabi, spoke on Total Abu Dhabi's vision for the energy mix towards 2030.

The technical visit on the last day of the meetings was to Masdar City, an ambitious

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 Pål Rasmussen addresses
 ARPEL 2015 in Punta del Este.

> project 17km from Abu Dhabi, which aims to become the world's first zero emissions city. The guided tour of the area was a good supplement to the workshop. The word Masdar means "source" and the city is intended to be a source for knowledge, being a community where academics and business professionals live, work, play and learn in an environment devoted to pushing the boundaries of sustainable design, construction and operation. The city hosts the headquarters of IRENA, an independent graduate research university, Masdar Institute of Science and Technology, and the region's only free zone industry cluster focused on sustainability, clean tech and renewable energy. When finished the city will be the home of 50,000 people.

> A press conference was held with good participation from the Abu Dhabi press. Jérôme Ferrier, David Carroll and Pål Rasmussen spoke on several themes, amongst others the relevance of having an IGU meeting in the Middle East, the organization's strategic cooperation and the role of gas in the global energy mix.

IGU thanks ADNOC Distribution for hosting this important meeting and agrees with the IGU Regional Coordinator for the Middle East and Africa, Khaled Abubakr, that Abu Dhabi was the perfect city to reflect both the global reach of IGU and the tremendous gas developments in the Middle East region.

ARPEL 2015

Pål Rasmussen attended the Oil & Natural Gas Conference organized by the Regional Association of Oil, Gas and Biofuels Sector Companies in Latin America and the Caribbean (ARPEL) in Punta del Este, Uruguay, April 7-9. The conference is a biennial regional forum for dialogue between the different energy sectors in Latin America and the Caribbean and gathered together the main players of the regional energy industry. The conference theme was "Cooperation and Innovation for a Sustainable Energy Development". The Secretary General participated in the opening plenary session and gave a speech on the global and regional perspective of the energy sector from the gas point of view.

Energy Charter Transit Seminar, Brussels

Torstein Indrebø, Honorary Secretary General, attended the International Meeting of Experts on Reliable and Stable Transit of Energy in Brussels, Belgium, April 22. He gave a presentation in a session on the role of governments

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in providing a favourable environment for major energy infrastructure projects. The meeting was arranged by Energy Charter and the Ministry of Foreign Affairs of Turkmenistan and attended by around 80 experts, many from the Caspian area and Eastern Europe.

China LNG Summit, Beijing

Jérôme Ferrier and the Chair of National Organizing Committee for WGC 2015, Daniel Paccoud attended the China LNG Summit in Beijing, China, April 22-24. Jérôme Ferrier gave an opening address on "What is driving China's natural gas and LNG demand?" He also met with top executives of China Gas Society and

→ During WGC 2015 IGU management held several meetings. ABOVE Pål Rasmussen and David Carroll with Maria van der Hoeven, Executive Director of IEA (second right) and Costanza Jacazio, Senior Gas Expert with IEA (right).

RIGHT Pål Rasmussen, David Carroll, Mel Ydreos and Jay Copan with Eldar Sætre, CEO of Statoil ASA (centre).

RIGHT, BELOW Mel Ydreos and Pål Rasmussen with Anita George, Senior Director of the World Bank Group's Global Practice on Energy and Extractive Industries.





China LNG Association to present IGU activities and promote WGC 2015.

WGC 2015

The 26th World Gas Conference – WGC 2015 – gave a great opportunity to meet with both international organizations and IGU members when it was held in Paris, June 1-5. During the conference, IGU management met with IGU members, MoU partners and other partners to discuss further cooperation and plans to educate policymakers on the importance of gas, advocate on behalf of the industry and support our members' advocacy efforts, and create

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▲ Taeksang Kwon talks to a visitor to IGU's stand at WGC 2015. engaging outreach campaigns to promote gas use.

IGU had a stand in the exhibition area and a large number of WGC delegates and many IGU members visited it. The new IGU reports on Wholesale Gas Prices, Biogas, the Prospects for Natural Gas towards 2050 and LNG were distributed, as well as the publication on shale gas. All the publications can be downloaded from the IGU website.

This issue of the IGU magazine has a special section on WGC 2015 *see pages 73-141*.

Global Gas Award

IGU's Global Gas Award for the 2012-2015 Triennium was presented in a special session on the last day of WGC 2015. The theme for the 2012-2015 Award was "Call for Sustainable Development and Innovative Promotion of Natural Gas". There were more than 500 submissions from which five runnersup and the winner were chosen. The winning paper was "Opening up the Gas Market" by a team of Angus McIntosh, Jamie McAinsh, Richard Mason and Caroline Geddes from the British distributor SGN. In this issue you can read more about the project described in their paper and one of the runners-up on pages 162-170.

Vienna Energy Forum 2015

The Vienna Energy Forum 2015 took place in Vienna, Austria, June 18-20. The forum is a biennial, global and multi-stakeholder forum arranged by the Austrian Government, the International Institute for Applied Systems Analysis and the United Nations Industrial Development Organization (UNIDO). The forum provides a holistic debate on the century's developmental challenges from the perspective of sustainable energy and on practical solutions to these challenges. This year's forum naturally looked forward to the Sustainable Development Goals Summit and the UNFCCC Conference of the Parties (COP 21) to be held later this year in New York and Paris respectively.

The IGU President, David Carroll spoke in a panel on "Energy Efficiency for Competitive Industries". IGU Wise Person and CEO of the Sustainable Energy for All (SE4ALL) initiative, Dr Kandeh Yumkella also participated in the event on behalf of SE4ALL and opened one of the sessions.

4th Member States' Gas Forum

GasNaturally, a joint advocacy initiative of IGU, Eurogas, GERG, GIE, IOGP and Marcogaz, organized the 4th Member States' Gas Forum in


While in Vienna for the IDB session Torstein Indrebø and Mats Fredriksson had meetings with Mohinder Gulati, Chief Operational Officer of SE4ALL (BELOW) and Pradeep Monga, Director of UNIDO's Energy Branch (BENEATH) to discuss the gas training seminar organized by IGU in cooperation with the World Bank in Mozambique in September.

 David Carroll addresses the 4th Member States' Gas Forum in Brussels.



Brussels on June 23. The forum discussed the role of gas in the European Commission's Energy Union strategy, in addition to providing a platform for discussions around the outlook for the global climate negotiations set to take place at COP 21 in Paris later this year. Forms of cooperation between gas and renewables were important in the discussions, and David Carroll gave a keynote speech on how gas and renewable energy sources can help achieve global climate objectives. In addition to David Carroll, Mel Ydreos and Mats Fredriksson participated in the event.

Embassy visits, Brussels

Courtesy visits to embassies are good opportunities to develop closer relationships with our member countries and their political establishments. On June 24, David Carroll and Mats Fredriksson, together with Anders Marvik, Vice President Statoil and Head of the EU Political Affairs Office of Statoil, paid courtesy visits to the Norwegian and American embassies in Brussels. The objective of the meetings was to present IGU and the new American Presidency. The meeting with the Norwegian Ambassador, Atle Leikvoll, centred





on what IGU, together with the Norwegian political establishment, Statoil and other actors can do for the gas market, especially in regards to gas advocacy. The meeting with the American Ambassador, Anthony Luzzatto Gardner, and Erica Thomas, Counsellor for Energy, Environment, Science and Technology, also went into important European gas market issues.



 Pål Rasmussen with the Kazakh ambassador to Norway, Kairat Abusseitov.

UNIDO Industrial Development Board

IGU has consultative status with UNIDO and was invited to the 43rd Session of its Industrial Development Board (IDB), which was held in Vienna, Austria, June 23-25. Torstein Indrebø and Mats Fredriksson attended the session and gave a verbal statement under the item for NGO information. The session attracted high-level attendance by ambassadors and some ministers and offered a good opportunity to meet many representatives of institutions and key individuals in the Vienna energy environment.

12th Russian Petroleum & Gas Congress

Pål Rasmussen participated in the Gas Day of the 12th Russian Petroleum & Gas Congress in Moscow on June 25. He co-chaired a plenary session on the Russian gas industry and gave a presentation on the global aspects of gas transportation, processing and export.

Kazakhstan embassy, Oslo

Pål Rasmussen and Torstein Indrebø met with the new Kazakh ambassador to Norway, Kairat

Abusseitov, on July 1. The objective of the meeting was to inform the ambassador about IGU and its activities and at the same time discuss IGU's participation in the KAZENERGI conference in Astana in September 2015. The ambassador also informed IGU about Kazakhstan's gas activities.

5th International YPFB Oil and Gas Congress 2015, Bolivia

David Carroll participated in the 5th International YPFB Oil and Gas Congress 2015. The congress was organized by IGU Bolivian Charter member Yacimientos Petrolíferos Fiscales Bolivianos in Santa Cruz, Bolivia, July 21-22. The event was attended by international experts, executives and authorities in oil and gas.

This year's focus was on the behaviour of and outlook for oil and gas markets, as well as energy security and challenges at the regional level. David Carroll spoke about the challenges for the oil and gas industry in a lower priced environment.

IGU meets with Chinese G20 Presidency

David Carroll, Pål Rasmussen and Mel Ydreos, together with Li Yalan, Chair of Beijing Gas Group Co., Ltd met with Mr. Zhang Yuging, Deputy Administrator National Energy Administration, People's Republic of China and staff from the Chinese G20 Presidency on August 10 in Beijing. China will assume the Presidency of the G20 later this year and the meeting's aim was to discuss and offer recommendations on how gas can be inserted into the G20 agenda of the Energy and Sustainability Working Group next year.

While in Beijing, the IGU leadership team also took the opportunity to meet and discuss regional issues with China's Charter member, China Gas Society, and IGU's Chinese Associate Members, Beijing Gas Group and China National Petroleum Corporation.

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Building for the Future



 Pål Rasmussen heads the BFTF project.

The "Building for the Future" (BFTF) project was launched to reflect changes in the global gas industry and to accommodate the growth of IGU's work in recent years. Continuous development is a requirement for any organization. We shall ensure that the long and proud history of the Union is honoured, but at the same time ensure we implement changes needed to stay relevant for the gas industry. For IGU to fulfil its vision and mission, new strategic initiatives have been launched and successful completion of these requires new and realigned resources. The BFTF project, headed by the Secretary General, is looking into how this can be ensured in the best possible way.

BFTF Phase I embraced a number of elements. First, the overall vision and mission of the Union were revised; then the membership structure was changed followed by a new membership fee structure. All of this to ensure the funding of IGU's strategic initiatives and ambitions on external communication, being the "Global Voice of Gas".

Phase I was approved by the IGU Council in Paris, France, June 1, 2015. The budget resulting from the new funding model will be presented for approval to the Council in Cartagena, Colombia on October 21, 2015.

With BFTF Phase I approved, the project is now moving into Phase II which aims at examining the IGU event portfolio and how IGU can best benefit from all three events: World Gas Conference, IGU Research Conference and the LNG XX Conferences.

The main motivation for BFTF Phase II is to ensure a good understanding of the governance and risk related to the events for IGU, for all involved parties, and to position ourselves better to face increased global competition. Even though the three main IGU events, by far, are already in the forefront of the global arena, competition is increasing and continuous development and improvement must be ensured for the whole IGU event portfolio.

With this in mind, BFTF Phase II will consider an optimization of the event portfolio, looking into whether IGU should take a greater part in the planning and execution of each conference and to ensure aligned branding of the events. Today the three conferences are handled separately with different governance models and different involvement between the host and IGU. Taking a greater part in the different event stages and maybe even institutionalizing a focal point for events within the organization will give IGU new possibilities.

Gas advocacy and strategic work is becoming increasingly important for both IGU and the industry, and it is important to ensure that IGU's vision and overall goals are reflected in a good manner in the three conferences. Greater involvement from IGU will give a better opportunity to influence and ensure that each conference has set objectives for the events to reflect this. The IGU events are a great opportunity to promote IGU's work.

BFTF Phase II will hence propose a new event model for IGU's conferences, linking these and the Union better together. The proposal will be finished before the Executive Committee meeting in Durban, South Africa, in April 2016. BFTF Phase III will cover the overall governance of IGU and will be presented to the Council in due course.



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COP 21 – Positioning Natural Gas



The 21st Conference of the Parties (COP 21) on Climate Change is rapidly approaching. Just as November becomes December, the world's eyes and ears will be focused on Paris and the climate negotiations, which aim at agreeing on an effective global approach to address climate change. Expectations are high that there will be consensus, and that the outcome will be a legally binding universal global climate agreement that can take over after the Kyoto Protocol when it expires in 2020.

The global gas industry fully supports efforts towards a sustainable energy future. It is a future that must consider all aspects of sustainability; economic, social and environmental. And it is within this context that the global gas industry feels so strongly about the role of gas.

"If policymakers are really serious about sustainability then they must recognize that greater use of gas is needed. Gas provides the fastest and most economic path to a less carbon intensive and cleaner air world," says Mel Ydreos, Chair of the IGU Coordination Committee.

IGU is constantly working and enhancing efforts to get this message across to stakeholders outside the gas industry. Through the Global Voice of Gas project, several key events have been identified that will be strategically important for our organization in the coming years. COP 21 is one of the first such key events. The climate conference will be a great opportunity to strongly express our views about the importance of gas as it brings together the vital political, regulatory, commercial and financial audiences.

IGU started preparing for COP 21 late last year and has prepared a strategy and scope of work to support the advocacy programs focused around COP 21. The strategy will, through clear and strong messages, firmly position gas in the context of COP 21, and is designed to position IGU as a credible thought leader on energy issues and a potential agent of change for the post-COP 21 environment. The messages conveyed will include answers to key questions related to gas and the economic, social and environmental concerns and opportunities.

The aim of the strategy is to build momentum to establish the Voice of Gas as an integral part of the broader discussion surrounding COP 21 and the future of energy.

However, IGU's campaign for COP 21 is not about influencing what happens at the conference, but rather credibly demonstrating that gas is the answer to the post-COP 21 challenges – how IGU can assist sovereign states develop policies that can drive real change to their energy mix.

This is why a high-level "Gas Day" event is being prepared to take place in Paris on December 5, 2015. A central theme will be the health benefits of gas and how gas can ensure air quality improvements especially in megacities around the world, while at the same time contributing to the 2°C degree goal. High-level external experts on the subject will be invited to speak. A "Gas Day" will get our messages through, while at the same time make it possible to build and formalize relationships with key influencers to create further momentum for the post-COP 21 decision-making process.

Greater details of IGU's COP 21 program will be shared at the upcoming IGU Fall Council meeting in Cartagena, Colombia, October 21, 2015.

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IGU Council Meets in Paris

By Mark Blacklock

The IGU Council meets twice in World Gas Conference years. The first meeting was held the day before the opening of WGC 2015 in Paris on June 1, while the second will be held in Cartagena de Indias, Colombia on October 21, 2015.

The Paris Council meeting was hosted by the French Gas Association (AFG) in the Mériden Étoile Hotel. Business focused on the handover of the Presidency from France to the USA and plans for the 2015-2018 Triennium including the election of the Executive Committee. The Council also approved IGU's Building for the Future outreach initiative and the accession of two new Associate Members.

After the preliminaries, Jérôme Ferrier, who was convening his last Council meeting as President, asked delegates to approve IGU's change of guard and the Council formally confirmed David Carroll of the USA and Jae Ho Song of Korea as IGU's new President and Vice President for 2015-2018 with effect from the end of WGC 2015.



The Council also confirmed Mel Ydreos as the new Chair of the Coordination Committee, Gi Chul Jung as Vice Chair and Terry Thorn as Secretary (he was subsequently made a Senior Advisor), together with the chairs of the committees, and elected the new Executive Committee.

 Jérôme Ferrier convening his last Council meeting as President.

The Council formally confirmed David Carroll (ABOVE) as President and Jae Ho Song (BELOW) as Vice President for 2015-2018.







✓ Jérôme Ferrier presents a diploma to Mahmoud Al Baloushi in recognition of Oman LNG's support for IGU's secondment program as Pål Rasmussen looks on.

"I look forward to the challenge as well as the privilege of serving you over the next three years," said David Carroll.

David Carroll and Mel Ydreos presented the Triennial Work Program for 2015-2018 with the theme "Fueling the Future". The distinction between working and program committees has been dropped and there will be 11 committees and two task forces.

The US Presidency is also introducing a Financial Advisory Board and an Honorary Global Ambassadors Network. "We want IGU to grow in importance, relevance and impact," declared David Carroll.

The Secretary General, Pål Rasmussen briefed delegates on IGU's Building for the Future outreach initiative which he said "aims to make IGU a more proactive, focused and effective advocate for the global gas industry". The Council approved a new Vision statement to reflect this and a new structure of membership fees to finance the initiative, together with the appropriate changes to the Articles of Association. There is now a sliding scale of membership fees with higher fees for larger producers and consumers of gas.

In addition, the new category of Premium Associate Member will allow a limited number



of Associate Members to obtain exclusive rights. At the same time, the eligibility for the traditional Associate membership has been widened, allowing all organizations with an interest in advancing the global gas industry to join IGU.

The Council also approved applications from Beijing Gas Group (China) and Enagás (Spain) to join IGU as Associate Members. Their accession means IGU now has 91 Charter and 53 Associate Members.

The hard work of the 2012-2015 Triennium was recognised with Jérôme Ferrier being

✓ The Paris Council meeting was attended by four of IGU's former presidents. With Pål Rasmussen, Jérôme Ferrier and David Carroll are Claude Détourné (1997-2000, second left), John Kean (1985-1988, third left), Datuk Abdul Rahim Hashim (2009-2012, second right) and George Verberg (2003-2006, first right).



made Honorary President and Georges Liens, the outgoing Chair of the Coordination Committee, an Honorary Member of IGU. (Diplomas had been presented to the chairs and secretaries of the committees and task forces at the Coordination Committee luncheon the day before the Council meeting.)

There were also awards for Robert Doets of the Dutch Charter Member KVGN, who was made an Honorary Member in recognition of his 30 years of service on the Council, and Mahmoud Al Baloushi of Oman LNG, who was given a diploma in recognition of the company's support for IGU's secondment program. Oman LNG seconded Khadija Al-Siyabi to the Secretariat for a two-year period which ended in May.

As the most senior Honorary President present, John Kean gave the closing address and thanked the French hosts.

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

The President's Dinner

The President's Dinner traditionally takes place on the eve of the Council meeting and the opening of the World Gas Conference. For WGC 2015 guests were invited onboard *Le Paquebot*, the flagship of Yachts de Paris, for a cruise along the River Seine.





IGU Council Meeting in Cartagena, Colombia

Colombia will host IGU's October 2015 Council Meeting. The event will take place in Cartagena, a magical city located in front of the Caribbean ocean. Founded in 1533, it was fortified to serve as an export port of silver and gold amazed from the Spanish colonies. Galleons departed from this city carrying the precious metals to Spain. The old city preserves its walls and fortifications. This will be the first meeting under the USA Presidency.

Colombia is a good example of how a country can implement a

ACIÓN COLOMBIANA DE GAS NATURAL

successful natural gas policy: 25% of total primary energy consumed in Colombia is natural gas. A long standing successful E&P policy has permitted the country auto sufficiency and export capacity in both oil and gas. The country's Hydrocarbons Agency has 354 contracts with upstream companies from all around the world.

Natural gas was found in the Colombian Caribbean basin in the late 1970s. Development of gas reserves and construction of a transportation and distribution networks were done mainly by private investment. Thanks to an adequate regulatory scheme, a highly diversified market has been developed: 64% (7,705,583) of all Colombian homes are connected to the gas grid. Manufacturing and thermal generation use natural gas as feedstock, and more than half a million cars and buses run on CNG.

The IGU Council Meeting will be a great opportunity to approve the Triennial Work Program and to discuss regional, as well as global issues, before the upcoming COP 21 Paris meeting.



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IGU Executive and Council Meetings Being Restructured to Deliver Greater Value to the Membership

By Jay Copan

The growing role of IGU in the area of gas advocacy, as well as the interest of the membership in more networking activities and greater knowledge transfer opportunities, has led to a restructuring of the IGU Executive Committee and Council meetings. This restructuring will be introduced for the upcoming Executive Committee and Council meetings, which will take place October 20-23, 2015 in Cartagena, Colombia.

Based on the results of the Spring 2014 IGU membership survey, as well as the ongoing IGU transition under the Building for the Future project, the IGU team – the Secretariat, the host country and the Presidency working together – have developed a program for the Cartagena meetings that will address the key issues facing the gas industry around the globe, debate and

 The IGU meetings will take place in Cartagena, Colombia, where part of the historic quarter is a UNESCO World Heritage site.



discuss the IGU position on these key issues, and, at the same time provide for greater networking activities as well as offering meeting attendees a significant increase in knowledge transfer opportunities.

The Executive Committee meeting on Wednesday, October 21 will follow the first formal meeting of the IGU Strategic Communications and Outreach Task Force. A major focus of the Executive Committee will be to address some of the issues and positions discussed and developed by the newly formed Task Force, IGU's strategy towards COP 21 and initiate discussions on developing effective and formalized policy positions.

The Council meeting will begin with a networking luncheon on October 21, and will be open to all delegates attending the Cartagena meetings.

Following discussions of the general IGU business matters on Wednesday afternoon, our Colombian hosts, Naturgas, under the leadership of IGU Executive Committee member, Eduardo Pizano, have invited Mr. Guillermo Perry, former Minister of Mines and Energy, and of Finance in Colombia and the former Chief Economist for Latin America and the Caribbean at the World Bank, to address the "Key Issues in the Colombian Gas Massification Success".

The Council meeting on Thursday, October 22, will feature a full day of networking activities and knowledge transfer opportunities. Following opening remarks by Mr. Tomás González, the Colombian Minister of Mines, Mr. Fuad Al-Zaher from the International Energy Forum will present the progress towards the gas data transparency initiative JODI Gas.



Following the opening presentations, a session on the "Outlook for the Global Gas Industry" will be held and will include an outlook for the global economy, as well as a more focused outlook for the global gas industry. Leading off the discussion will be Luis Herrera, Chief Economist from BTG Pactual , with Bassam Fatouh of the Oxford Energy Institute being joined by a senior IHS CERA representative to offer their perspectives on the outlook for the industry.

"What Does COP 21 Mean for the Role of Gas?" will be a second topical workshop on Thursday, October 22. This session will also include a discussion of the IGU strategy for COP 21. A senior representative from UNFCCC/ UNEP will kick off the session followed by Dr. Kathryn Clay from the American Gas Association discussing the US plans towards COP 21 as well as recent environmental announcements. Jason Bordoff from Columbia University Center on Global Energy Policy will discuss clean air within the context of COP 21 and an invited speaker from Asia will provide an overview of the submitted Asian country plans towards COP 21. Following a networking luncheon, the afternoon session will feature a discussion of "Key Issues and Opportunities in the Latin American Gas Industry". The senior officers of four major Latin American energy companies have been invited to speak on this topic.

The day will wrap up with special networking breakout sessions where the attendees will move into smaller groups to discuss the key issues facing the gas industries in their countries and how these issues relate to the discussions held throughout the day.

Naturgas has planned a number of fantastic evening networking opportunities for the group, as well as a very interesting technical tour on Friday, October 23.

Further information is available on the IGU website at www.igu.org. The hosts, the Presidency and the Secretariat hope that each and every Council member (and Coordination Committee member) will be able to attend what will be a very exciting, stimulating and rewarding series of meetings in Cartagena.

Jay Copan is a Special Advisor to the IGU President.



 Key issues in the Colombian and South American gas industries will be discussed in one of the sessions – exploratory drilling for shale gas in the Chiquinquira block, Colombia.

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Reports from the Regional Coordinators



Khaled Abubakr.

 Major discoveries in countries such as
Mozambique have made
Africa a key player in the international gas business. Following contributions to the last issue from IGU's Regional Coordinators for Asia and Asia-Pacific, Europe and the Russia-Black Sea-Caspian area, we have reports from the Regional Coordinators for Africa and the Middle East, Latin America and the Caribbean and North America.

Africa and the Middle East By Khaled Abubakr

Africa and the Middle East have combined proved gas reserves of more than 3,000 tcf and annual production of 29 tcf. With hundreds of billions of dollars being invested each year for natural gas exploration and production, this region is a focal point of the worldwide oil and gas industry.

Up to 2030, Africa's natural gas production is projected to record the highest annual growth rate of 4.3% versus a world growth rate of 1.9%. It is also expected that Africa will supply



more than 10% of the world's gas by 2030. Major new discoveries of natural gas in many parts of Africa are leading to the development of a greatly expanded industry – making Africa the new Middle East of hydrocarbon development. Gas exploration in the Mediterranean Sea as well as major discoveries in Mozambique, Tanzania and West Africa have made the region a key player in the international gas trade with the possibility of addressing two major underpinnings of economic development:

- Energy access, for both electricity and for clean cooking;
- Affordable energy for transport, economic growth and industry, including fertilizers.

Asian buyers are lining up to sign new deals for LNG from Mozambique, which could transform the country's economy and give it a front row seat in supplying rising global gas demand. Meanwhile, North Africa – the "Old Guard" of the continent's natural gas sector – also has a significant role to play in the growth of the industry with Algeria being export focused and Egypt domestically focused. International oil companies have signed new natural gas investment agreements in Egypt totaling \$19 billion and the country has started LNG imports.

The development of the gas industry in the East Mediterranean region not only has the potential to fulfill regional demand, but also to impact European and Middle Eastern gas markets. This region is the new energy transit hub and a frequent target of energy import and export project proposals, mainly due to its a favorable location between major supply and demand centers.

The Arabian Gulf's vast natural gas reserves suggest a potential future role as a major



regional and global supplier of gas. However, it also faces rapidly growing demand that could prove difficult to satisfy due to the region's industrialization drive and expanding demography. Surprisingly, the Middle East, which has 40% of the world's remaining gas reserves, is struggling to find enough gas to meet its own expected demands. Middle Eastern countries are among the world's highest gas users per capita, since natural gas is playing a larger role in all aspects of the region's economic growth and activity, and it has become a key consumer fuel which is good news for gas veterans.

It is clearly noticeable that despite the instability caused earlier by the Arab Spring, the Middle East and Africa region will remain a key player in the natural gas and fossil fuel market as a whole. It's also worth mentioning that the region's location and the expansion of the Suez Canal, which will double the canal capacity and reduce the waiting time, will enhance the trade of goods and commodities as well as LNG and other oil and gas derivatives.

IGU is keen to bring value added to these developments by sharing and promoting best practices and policies.

Khaled Abubakr is the Chairman of TAQA Arabia and the IGU Regional Coordinator for Africa and the Middle East.

How the Low Oil Prices Scenario is Affecting the Industry in the Latin America and Caribbean Region

By Cynthia Silveira

In the first half of 2015, the low oil prices scenario was accompanied by a reduction in world commodity prices, China's currency devaluation, the Greek crisis and the strengthening of the US dollar. These factors imposed more difficulties than benefits for the Latin America and Caribbean region economies, which are highly dependent on commodity exports.

Brazil, which has the largest economy in the region, is facing not only an economic crisis but

also a deep political crisis the outcome of which is difficult to forecast. At the heart of this political crisis lies the main oil company, state-owned Petrobras, whose market value has fallen more than 50% over the past year.

The recently-published Petrobras five-year plan reduces investments to \$130 billion from \$207 billion of the previous plan. It also cuts the forecast for oil and gas production in 2020 to 2.8 million bpd, compared to the former 4.2 million bpd prediction.

Although the economic crisis is contributing to a reduction in energy demand, the current situation will probably lead to continued growth of LNG imports. The increasing importance of the LNG trade for the Latin American region contrasts with the long-term potential for reserves to be developed from conventional and unconventional resources in the continent.

Bolivia is expected to continue playing an important role as a gas supplier both to Argentina and Brazil. In July 2015 during the Fifth YPFB International Congress, the Hydrocarbons Ministry presented a forecast of \$30 billion investments for the sector up to 2021, expecting to add 7 to 12 tcf of gas to reserves over that period. These investments are essen-



Cynthia Silveira.

 Argentina is working to develop production in the Vaca Muerta shale of the Neuquen Basin.



tial for the country to keep supplying Argentina and Brazil.

Argentina continues with its development campaign for Vaca Muerta, gaining more knowledge about the country's unconventional reserves and production technology. However, a long-lasting low oil prices scenario could reduce the pace of development. An impressive 800 tcf is forecast as total reserves for the country, 308 tcf from Vaca Muerta alone, while production is expected to reach 3 million bpd in 2017.



The investment capacity in these countries to develop their domestic production will determine the size of the LNG trade for the region. The reduction in LNG prices will also contribute to growth in demand.

In the Caribbean region small-scale LNG is a promising opportunity for the countries to count on a cleaner energy.

Overcoming the great challenge of attracting investments and accessing credit from financial institutions will be crucial for the gas industry in the region and IGU's gas advocacy will be a valuable support.

Other areas of importance for the industry's development are:

- Access to competitive gas supplies, including the removal of barriers to the development of unconventional gas reserves and the implementation of attractive fiscal regimes;
- Best practices related to access and development of enabling gas infrastructure;
- Development of sustainable gas demand, in particular in the residential and power sectors and co-generation.

The opening up of US foreign policy towards the region, highlighted by the resumption of relations with Cuba and the recent visit of US negotiators to Bolivia, combined with the US Presidency of IGU in the 2015-2018 triennium, will certainly "fuel" the future of the gas industry in Latin America and Caribbean.

Cynthia Silveira is the Executive Director of Exergia Consultoria e Projetos S/C Ltda, a member of the Executive Committee representing Associate Member IBP, and has been the IGU Regional Coordinator for Latin America and the Caribbean 2014-2015.

North America

By Timothy Egan

As I write this the dominant story in the North American energy marketplace remains the continuing decline in the price of oil: it has fallen below \$40 and there is much speculation about how much lower it will go. The effect on the North American gas industry is varied. Producers - often integrated oil and gas enterprises - are being challenged to deliver financial results and are very focused on innovations that continually drive greater cost efficiencies. This is particularly the case in higher-cost plays like Canada's oil sands, or in prospective new developments like those opening in Mexico. Pipeline companies - and these are often oil and gas carriers - are more sheltered but are feeling a chill on expansion projects as the economics of those comes into question. On the downstream side, the opportunities for gas expansion into markets like mid- and lighterduty transportation vehicles become a much harder sell with the virtual elimination of the price delta on an energy equivalent basis between diesel and gasoline (petrol) and natural gas. Hedging has softened the blow for some producers in 2015, but the pain will be greater in 2016. And many producers have seen non-cash charges (and thus net losses) for write downs on the value of reserves.

At the same time the story is good news. For North American consumers, affordable energy products – gas or oil – have been a longstand-



Timothy Egan.



ing advantage. Increases in electricity prices have prompted many to question whether that advantage will continue, but very affordable gas and oil rates are re-confirming it. This isn't just about money in consumers' pockets though, it's about investment: attracting energy-intensive investment to jurisdictions across the continent is increasingly a priority. The gas advantage of the last half decade is now complemented by an oil product advantage. In addition, the fact that oil from new fields like Bakken in the US and the Canadian mid-west can be produced economically at prices no one would have thought possible just a few years ago speaks to the significant innovation in exploration and drilling technology - the very same kind of innovation that triggered the extraordinary natural gas development in North America over this last decade. Gas has been playing a greater and greater role in the generation of electricity and as a back-up fuel partner to the deployment of renewable energies. To the extent that these technologies still require subsidies that ultimately get passed to the consumer, the lower gas prices are reducing the overall cost of generating electricity because when they are called upon, they help deliver electricity at lower cost. While many don't appreciate this fact, the low price environment actually helps with the more rapid deployment of renewable energies than would otherwise be possible.

The tension across the value chain – producers wanting higher prices, distributors wanting lower ones – is an ongoing one. But the fact remains that the market for natural gas continues to grow in North America. Power generation (as discussed), off-grid remote applications, combined heat and power, and increasingly marine, heavy vehicle, and off-road transportation are continuing to expand, helping natural gas maintain its foundation fuel status. And with export LNG projects continuing to show progress, albeit not at the pace suggested a few years ago, the mood overall – even in the



face of the oil market and global economic volatility – is cautiously optimistic.

All in the industry tracks the market factors closely - while also watching carefully the changing environmental policy framework. The actions of the Obama administration - which resonate in markets north and south of the US - as it continues to define a legacy agenda on emission controls in a COP year, is key here. Executive Office actions to substantially reduce emissions are triggering strong debate, but the natural gas industry is well positioned because of (1) a strong record and focus on emission reductions of its own developed over many years, (2) its partnering with other technology and fuel players to help deliver sustainable energy services and (3) the low emission profile of our product. Environmental opponents of hydrocarbons find it difficult to embrace natural gas, but they can't deny the positive economic and environmental story of the fuel: this is a discussion we all need to follow closely.

Timothy M. Egan is the President & CEO of the Canadian Gas Association and the IGU Regional Coordinator for North America. ▲ North American export LNG projects are continuing to show progress – Train 1 of Sabine Pass is due to start LNG production by the end of 2015.



TBG has been the owner and operator of the Bolivia-Brazil Gas Pipeline since 1999, delivering up to 30.08 million cubic metres of natural gas per day to the Brazilian market, which currently represents 35% of national demand for natural gas.

With a length of 2,593 km in Brazil, 28% of the total natural gas Brazilian network, TBG's pipeline crosses 136 municipalities in five states, Mato Grosso do Sul, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul.

The maintenance of the pipeline system is entirely performed by TBG's own staff, composed of specialised and trained professionals. The Supervision and Control Center (SCC), located in Rio de Janeiro state, remotely operates 15 compressor stations, 50 city-gates and other pipeline facilities.

Our experience in pipeline engineering entitles TBG to expand, with high standards of excellence, its position in the natural gas transmission segment. TBG grows each year, gathering achievements and overcoming challenges, enhancing the company to be more competitive and to become a reference both locally and abroad.



 Pipeline Operation at the Supervision and Control Center, Rio de Janeiro.



◀ TBG offers a portfolio of services in all areas of gas transmission.

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The Compressor Station at Campo Grande, Mato Grosso do Sul.

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We have been contributing for 16 years toward the growth of the natural gas sector in Brazil and, over time, we have improved our strategic performance to meet the new challenges of the natural gas transportation market, providing innovative and technological solutions.



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News from Organizations Affiliated to IGU

We start this issue's section with an article on the European Gas Technology Conference (EGATEC 2015) jointly organized by the European Gas Research Group (GERG) and Marcogaz – Technical Association of the European Natural Gas Industry. Then we have articles from the World LPG Association (WLPGA), Energy Delta Institute (EDI), NGVA Europe, NGV Global and Pipeline Research Council International (PRCI).

EGATEC 2015 – Creating the Gas Revolution

By Alexander Schwanzer

Innovation and technology are essential for the future of the natural gas industry and the third European Gas Technology Conference (EGATEC 2015) provides an excellent forum to discuss the latest developments. It will take place in Vienna, Austria, November 25-26 at the Park Royal Palace Hotel.

EGATEC 2015 is organized under the joint auspices of Marcogaz – Technical Association of the European Natural Gas Industry and GERG – European Gas Research Group, and is hosted by OVGW, the Austrian Association for Gas and Water.

EGATEC 2015 is intended to present and discuss new strategies and innovative ideas covering the main topic "Creating the Gas Revolution". More than 250 high-level representatives from the European gas industry, delegates from science and research organizations, companies and many other stakeholders will participate in this landmark conference.

"Innovations are essential, if gas is to continue to play an important role in a lowcarbon energy mix in Europe for the future. EGATEC 2015 is the only European gas event to get first-hand information from the world's leading experts in their field," says Jean-Claude Weber, Marcogaz President. "Be part of the gas revolution and join us in Vienna!"

Conference program

The conference program includes more than 30 presentations, four technical visits and an





exhibition, demonstrating the important role of gas in Europe's current and future energy portfolio. Furthermore, the GERG Young Researcher's Event (previously known as the GERG Academic Network) will form part of EGATEC 2015.

The program covers the whole gas value chain beginning with Strategy for Gas in Europe 2030 in Session I and Power to Gas in Session II. The first day of the conference closes with the GERG Young Researcher's Event. This is the chance for students to present their submitted masters or doctoral thesis in the field of gas to all conference participants and to receive one of the sought-after GERG Young Researcher's Prizes – so sign up now!

In the evening there will be a welcome reception at City Hall hosted by the Mayor of Vienna.

Day two kicks off with Session III, Sources, Supply & Security for Europe, which will look at issues such as the harmonization of gas quality as well as LNG and pipeline supplies. In Session IV we look at Renewable Gas, giving particular importance to the alternative and CO₂-neutral energy resource biogas, with its extremely high growth potential for Europe. In Session V, Gas in Transport & Mobility for Europe, we focus on the various environmentally-friendly natural gas/ biogas-mobility systems for Europe and in this context also on the growing importance of LNG. Session VI, Innovative Gas Appliances & Domestic Systems concludes the series of presentations looking at applications such as CHP, fuel cells, hybrid systems and gas heat pumps. The conference wraps up at with the presentation of the three GERG Young Researcher's Prizes.

We are extremely proud that this important discussion is taking place in the popular conference city of Vienna and look forward to welcoming delegates.

Vienna – a charming conference destination In 2014 Vienna was chosen to be number two worldwide as a conference destination and first



worldwide as the most reputable city. Furthermore, Vienna is ranked fourth in the European Green Index. Therefore, the national host OVGW is confident that participants will enjoy their stay in the city with its exciting combination of the Imperial flair of the past and the latest trends, the responsible cultivation of a precious heritage and its charming traditions. Vienna is also the ideal venue to combine the conference with pre-Christmas shopping at the world-famous Christmas markets.

Alexander Schwanzer is Head of the Certification Department & Representative in European Gas Affairs at OVGW. For more information visit www.egatec2015.com. ▲ Vienna's attractions include the famous Christmas markets (ABOVE). The city's Park Royal Palace Hotel is the venue for EGATEC 2015 (BELOW).





 Most LPG users are women.



▲ Nikki Brown, Managing Director of Cavagna UK, will chair WINLPG.

WLPGA Launches Women in LPG Global Network (WINLPG) By Alison Abbott

Why WINLPG?

There is an opportunity for the global LPG industry to take medium- and long-term actions that can address the issue of attracting, retaining and developing women in the industry. As the authoritative global voice for LPG, the World LPG Association (WLPGA) is uniquely positioned to develop and implement these actions.

According to Energia, an NGO focusing on women's issues in the energy industry, most LPG consumers are women. Many women make and manage the purchasing decision and it is largely women who are using the product. However, within the industry itself there are few women, not only at executive level, but at all levels. This phenomenon is shared in many sectors of the energy industry and indeed in other areas of business.

Having more women in management positions improves a company's financial performance and can boost company returns. Evidence shows that companies with women on their boards outperform their rivals by a 42% higher return on sales by enhancing company decision making through use of all available perspectives, ideas and skills¹, reflecting that gender diversity of customers and employees is beneficial to the industry. The industry also suffers from the negative perception of being old fashioned and uninteresting, indeed a recent graduate survey showed that the oil and gas industry as a whole is one of the most unpopular career paths².

The Women in LPG Global Network's mission is to support and help empower women in the worldwide LPG industry through leadership, coaching, mentoring and promoting role models to enable a change in organisational attitude to become more inclusive and authentic for all genders at all operational levels by promoting the sound belief that women have a unique set of qualifications and abilities that can contribute to any business.

There are also a host of established network groups in other, similar industries. For example, the Global Women in Nuclear Association, Women in Mining and Women in Solar, and meetings with these bodies have proven fruitful in sharing best practices to enable the speedy and efficient set up of WINLPG.

How?

The three pillars of objectives for the network will be to support and retain women already in the industry, to promote role models and case studies via media and at industry events and, in the more long term, to educate and attract women to the industry.

The network set-up will mirror existing WLPGA networks and will initially meet three times a year with a flagship meeting to be held at the time of the World LPG Forum. Regional workshops will be scheduled to tie in with other industry events.

WINLPG will be chaired by Nikki Brown, Managing Director of Cavagna UK and will be coordinated from WLPGA by me.

¹ www.gov.uk study entitled "Women on Boards".

² PWC 2011 survey of 4,364 graduates from over 75 countries.

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take it further.

"The issue is that gender balance is not optimised in the LPG industry," says Nikki Brown, "and WLPGA is in a unique position to start to make a change, this change to be driven by a network that will recommend actions and activities as part of the WLPGA strategic planning process."

The inaugural meeting will take place at the time of the World LPG Forum in Singapore on Tuesday 29 September between 1500 and 1700 followed by a networking cocktail reception. If you're planning to attend the Forum in Singapore and are interesting in coming to the network meeting please contact me for more details (aabbott@wlpga.org).

WLPGA is looking forward to developing this new network and working towards changing the face of the industry.

Alison Abbott is the Communications and Marketing Director of the World LPG Association (www.wlpga.org).

Towards Sustainable Energy Growth

By Aliona Duca

 Energy Delta Institute had a presence at WGC 2015. The energy world today is confronted with pressing global challenges such as climate change, the growing world population and economic



development, conservation of ecosystems and security of energy supply. Despite these external uncertainties, some key features of the evolution of international energy markets over the coming decades are already evident. On one hand, we witness the continued rise in demand for energy as a result of the growing world population and economy. On the other hand, although fossil fuels remain the dominant type of fuels in world primary energy supply, their share in the overall fuel mix will fall gradually until 2040 to about 75%. Renewable energy sources together with nuclear power make up the remaining quarter of world primary energy supply. Intermittent energy shows the fastest growth rate of any fuel, as low-carbon fuels increasingly replace fossil fuels, in particular in the power sector.

During the 26th World Gas Conference (WGC 2015) in Paris, the International Energy Agency (IEA) declared that the promised "golden age" of natural gas will have much more lustre for some countries than others, as the resource is increasingly squeezed between renewable energy and coal. In the current market conditions, where coal is very cheap and climate policies and carbon pricing remain weak, while the costs for renewable technologies are gradually falling, it is difficult for natural gas to compete. In addition, in jurisdictions with stronger climate policies, renewables are prioritized.

At WGC 2015 Energy Delta Institute joined forces with A.Hak, EBN, NMI Euroloop, Gasunie, GasTerra, NMI Certin, VSL and Seal for Life on the exhibition stand "Power of Dutch Gas". In addition, our young professionals took part in the WGC 2015 Youth Event and came third out of more than 20 competing groups with the topic of local access to sustainable energy. We had the pleasure to meet and debate the issues facing the gas industry and share our educational portfolio and other services with about 9,000 delegates, trade visitors and other exhibitors. Energy Delta Institute is continuously improving and broadening its portfolio in order



to meet the latest needs of the energy market and share best practices from the industry.

We, as consumers and producers, are on the verge of a revolution in our energy system, as we witness big changes to the way electricity is produced, transmitted and used. Due to the growth of renewable energy, amongst other factors driven by the need to meet the 2020 and 2030 targets as part of the European Union Energy and Climate Framework, energy companies are currently faced with the challenge of adopting new business models. The roles of Distribution System Operators (DSO) are changing, as they will have to manage their grids actively using a variety of solutions including storage and demand management. At the same time, consumers will become producers and use smart meters and smart grids to modulate their demand to save money.

As a result of these developments, Energy Delta Institute is pleased to introduce the Mini MBA New Energy Realities. This joint excellence program, where Energy Delta Institute closely cooperates with its knowledge and business partners, addresses the major challenges in the search for new business practices. Moreover, the program takes a multidisciplinary approach, taking into consideration a number of issues such as legal, financial, technological, economic and public acceptance.

As mentioned above, this program, in particular, tackles the concept of "new" business models for the energy industry and provides a foundation of financial solutions to the current transformation processes of the energy industry. Moreover, the program prepares participants to become energy experts and strategists in order to chart their company's course through politically charged waters. This Mini MBA covers three main themes: new business models, financing the new energy reality and innovation and leadership.

In the first module participants will gain insights into the changing value proposition of



an energy company and will elaborate on the appropriate business models. In cooperation with Nyenrode Business University and PwC, this module analyzes in detail the new European market design initiative and ways in which the changing role of consumer and efficiency targets can overcome the disruptive changes in a decentralized energy market.

In the second module, Bloomberg New Energy Finance will review global financial trends and how they affect the energy industry. Moreover, practical applications of project finance and in particular a review of the offshore wind revolution case will be applied.

Last but not least, the module on innovation and leadership will address the leadership skills required for energy companies in the changing Energy Delta Institute has introduced the Mini MBA New Energy Realities.

energy landscape and elaborate on how to capture value from innovations. In cooperation with Aachen University and the University of Groningen, this module highlights examples of some of the technological game changers that will shape the energy sector of the future.

Many of the leading economies, particularly in Western Europe, already see significant changes in their energy mixes. Although renewables are becoming more competitive in the European power sector, they cannot meet the demand for sustainable clean energy alone. Natural gas could provide a backup for renewable energy boosting the reliability of power systems. These are some of the challenges that energy professionals need to be prepared to face in the coming decades.

By taking part in Energy Delta Institute's unique Mini MBA New Energy Realities, participants not only confront the threats to the gas sector but also try to solve the puzzle of the new energy revolution.

Lennart Pilskog,
Secretary General of NGVA
Europe at WGC 2015:
natural gas as a fuel offers
cleaner air and significant
CO₂ reductions.

Aliona Duca is an Energy Analyst with the Energy Delta Institute. For more information on EDI's executive education portfolio including its customized in-house training programs, visit www.energydelta.org.

NGVA Europe at WGC 2015

By Zeger Luijendijk

NGVA Europe looks back at a very successful participation in the 26th World Gas Conference in Paris. WGC 2015 prominently featured natural gas as a fuel in transport, with, for the first time, a big exhibition of natural gas vehicles. On show were many cars, trucks and buses on the market today that drive on CNG and LNG. Alongside the exhibition, a host of gatherings and forums highlighted the benefits and challenges of natural gas as a fuel, among which was a political forum organized by NGVA Europe and NGV Global, with speakers from the European Commission, the European Parliament, UNECE, the International Energy Agency and IGU.

Speakers pointed out the opportunities for natural gas as a fuel, but also some of the challenges. Natural gas cars lack, for example, the "buzz" electric cars have among consumers in the passenger car market, Lászlo Varró, Head of the Gas, Coal and Power Markets Division of IEA said. But then cars are a "fashion article", he said, and in addition the infrastructure for electric cars is already there: everybody can plug them in at home.

But that doesn't mean there will not be many more cars running on natural gas, retorted Lennart Pilskog, Secretary General of NGVA Europe. Natural gas as a fuel offers cleaner air and significant CO₂ reductions, all of them benefits that cannot be simply discarded. With an expanding infrastructure





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for CNG as a result of investments in a cleaner urban environment, and also more stringent standards for air quality, natural gas would only become more attractive as a fuel for car owners, he said.

Varró of IEA added he saw strong potential for natural gas in heavy transport and in urban areas, in spite of the needed investments in upgrading and developing engine technology and building the necessary infrastructure. He also said that the production of biomethane from renewable energy sources would be an essential complement to natural gas. Ultimately environmental requirements would make the difference, he predicted, as they had done in Asia where air pollution from trucks had led to political decisions to switch from diesel to natural gas on a large scale.

Other obstacles to the growth of natural gas as a fuel are the lack of standards, said Scott Foster, Director of UNECE's Sustainable Energy Division. If gas as a fuel is to grow more rapidly, he added, it should focus more on trucks and buses and be stimulated more extensively, in particular through fiscal provisions and measures to improve air quality. In the meantime UNECE would work hard with the industry to get rid of technical barriers, in a special working group that is chaired by NGVA Europe.

Biomethane also features prominently on the priority list of the EU Commission, which gave an overview of measures already taken to promote the use of natural gas as a fuel, and where some more work is needed. Antonio Tricas-Aizpun of the EU Commission repeated the overall target set out in the Climate and Energy Framework by the EU of greenhouse gas emissions 40% below the 1990 level by 2030 with at the same time an increase of renewable energy by at least 27%. Natural gas and biomethane are both part of the energy mix of alternative fuels required to substitute oil in the long term, with the Directive on Deployment of Alternative Fuels Infrastructure (DAFI) as one of the main drivers to promote its use.

More buses and trucks on natural gas as fuel will offer a relative quick solution to air quality problems, said Christine Revault d'Alonnes-Bonnefoy, French MEP for the Alliance of Socialists & Democrats. Natural gas, she added, should therefore be seriously considered as an alternative fuel.

The French MEP is a member of the Transport Committee of the European Parliament and also has a seat on the council of Val-de-Marne department, which borders the city of Paris.

Christine Revault is a strong supporter of cleaning up the urban transport environment quickly and is not wholly convinced of the measures that some local authorities have taken. In the case of the hybrid-electric buses that the city of Paris operates, she said, it can be found that they consume more diesel than electricity.

Given the need in urban areas for cleaner air and – in general – lower CO_2 emissions, the French MEP said, natural gas should be part of "a mix of solutions", as she indicated, in particular including biomethane.

"At present we talk in the European Parliament mainly about electricity being the only way forward, but I also talk about gas as part of the solution", she said, adding she would work politically on several levels to promote natural gas as a fuel.

A special event was the arrival of the 2015 Blue Corridor Rally for natural gas vehicles across Europe, organized by Gazprom and E.ON and during which natural gas vehicles covered the distance from St Petersburg to Paris.

Zeger Luijendijk is the Communications Manager of NGVA Europe (www.ngvaeurope.eu).

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▲ CATARC's Guan Yu addresses the joint NGV Global-NGVA Europe seminar during WGC 2015.

Political Will an Essential Driver of Natural Gas for Transportation By David Perry

Political will is one of the essential criteria to building the natural gas for transportation marketplace. China is showing how to transform its energy and transportation environment. Europe, challenged by diverse political agendas, nevertheless is also making ground.

In a market research report (2013), China Automotive Technology and Research Centre (CATARC) reported 1.577 million vehicles powered by natural gas in China as at the end of 2012. At the recent World Gas Conference in Paris, where visitors to the joint NGV Global-NGVA Europe natural gas for transportation village seminar program received a market update from CATARC, it was revealed the number of NGVs has surpassed 3 million officially, and due to data still being collected, may indeed have reached or exceeded a staggering 4 million NGVs, more than in any other country.

There exists political will and the means in China to transform itself into a modern technologically proficient energy-conscious society, and certainly from a natural gas fuel perspective it appears to be doing just that.

In 2013, China's State Council published a document (SCS 12)¹ on "Strengthening the Internal Combustion Engine (ICE) Industry". At a related meeting, Deputy Minister of Industry Su Bo bluntly pointed out that with continuing advances in ICE technology internationally, China had a gap to bridge if its industry was to be respected and competitive - low-level core technologies, imperfect standards regulation, high energy consumption and high emissions were just some of the indicators that change needed to happen. At the same time, the growing demand for ICE engines in China was insatiable. The Deputy Minister made it very clear China was determined to bridge that gap, and do it quickly.

Natural gas fuel was scripted as a prime agent for broadening the energy matrix and for addressing transport-related emissions that have been choking China's major cities. As Guan Yu, Director of the Market Research Department of the Industry Development Research Institute at CATARC and Vice President of NGV Global allied association ANGVA, explained during the seminar: "The Opinion of the General Office of the State Council on Emphasizing Energy Efficiency and Emission Reduction of the Engine Industry specified key projects and requires the local governments to give priority and subsidy to clean energy, especially NGVs."

Included measures focused on dual-fuel engine technology for land and marine applications, and support for natural gas engine development through research. Field trials will build market confidence. New policies will be written to guide a disciplined approach to standards development and implementation, addressing safety, emissions measurement and resourcing. New policies will also assist stimulate the market financially, through the introduction of various economic incentives that

1 http://www.gov.cn/zwgk/2013-02/17/content_2333161. htm (Chinese).



provide tax relief, invigorate investment and increase commercial viability.

In the opinion of the State Council, expressed in SCS 12, there is expectation that by 2015 the promotion and uptake of natural gas as a fuel for transportation through the use of single- and dual-fuel engines will "achieve 10 million tons of fuel substitution goods" and the "use of alternative fuels [is expected] to save 15 million tons of fuel commodities".

The new policy environment is bringing results. In April this year, the International Finance Corporation (IFC) put together a \$300 million financing package for China Gas





▲ China's NGV sector is growing rapidly. (above) Foton's Auman LNGpowered tractor unit and (*left*) Shanxi Northwest Natural Gas Company's CNG/LNG fueling station in Xinzhou City.

Holdings Ltd. to help support China Gas' expansion of city gas distribution infrastructure and the building of new natural gas refueling stations. Switching to gas-powered vehicles will have a direct and tangible benefit for city dwellers.

"[China's] national oil and gas pipeline network is gradually taking shape," remarked Lin Song, Pipeline Research & Development Center, PetroChina recently. Broader infrastructure means increased availability of fuel for all sorts of mobile applications.

"Natural gas vehicles have significant growth potential in China because they're more economical than conventional models and because the government is committed to fighting pollution," Ricky Wang, an analyst at ICIS-C1 Energy, a Shanghai-based commodity consultant, told Bloomberg Business² in July this year. "Gas demand from the transport sector is booming."

"Liquefied natural gas (LNG) is already used in a significant and rapidly growing number of highway trucks in China. And the technologies developed there and produced at scale are likely to gain a foothold in the North American market in the near future," Shell representatives explained at a global media event at the

2 "Choking Smog Puts Chinese Driver in Natural Gas Fast Lane" – *Bloomberg Business*, July 4, 2015.

Southwest Research Institute (SwRI) in San Antonio, Texas, in June.³

GE has also reported on China's NGV development: "By the end of this year [2015], China's LNG fueling network is expected to expand to 3,500 stations, from less than 2,000 in 2014, while LNG usage as transport fuel is forecast to grow by 30% to 40% a year over the next five years," says Michael Lin Sheng, who leads the Asia oil and gas team for IFC. "Globally, there's nowhere that's comparable to what's happening in China."

European developments

Similarly strong political will is found in Europe, albeit in a more challenging environment as the collective EU policy environment also has to find a willing partner in a host of national agendas. The number of vehicles powered by natural gas and biomethane increased steadily in Europe in 2014, according to NGVA Europe, with almost 1.9 million NGVs recorded by September of that year.

In late 2014, the European Commission reiterated its position that alternative fuels are urgently needed to break the overdependence of European transport on oil. Transport in Europe is 94% dependent on oil, 84% of it being imported, with a bill up to €1 billion per day, and incurs increasing costs to the environment.

Like China, the European Union seeks to reduce emissions caused by all forms of transportation fuel and has adopted Directive 2014/94/EU which requires Member States to develop national policy frameworks for the market development of alternative fuels and their infrastructure. Yet the EU does not have the same expeditious capacity as China's government to implement decisions; as a first step toward fulfilling the EU Directive, Member States have two years to submit their national

3 "Natural gas trucks: Coming soon from China?" – *FleetOwner*, June 12, 2015.

policy frameworks, by 2016. Completion periods are inevitably longer, for example, rolling out CNG along the TEN-T core network is pegged for the end of 2025.

A slower policy environment is not necessarily an impairment to progress, however. Daniel Lambert, Business Development Manager for ENN Europe, spoke at the NGV seminar about "Working Together to Make a Difference against Diesel" in Europe. He explained there are multiple reasons for changing from diesel to natural gas, but given the omnipresent nature of diesel, the almost invisible profile of natural gas, market scepticism and some technological issues that still to be addressed, much needs to be done before natural gas will grow as a widespread fuel of choice.

ENN, China's largest privately owned energy distribution company and operator of 600 natural gas fueling stations in China, has successfully gained a foothold in North America where it operates 30 stations. It seeks to take that experience and build presence in Europe.

Rapid and flexible deployment of lowercost infrastructure is a key to building capacity quickly, Lambert explained. Modular or "box" refueling systems, such as those offered by ENN, Galileo, GE and others, deliver quick solutions for co-located or standalone stations and make rapid expansion of the natural gas network possible. Modular and mobile solutions also mean refueling is not limited to pipeline locations.

Natural gas as a fuel for transportation is without peer for its unique combination of availability, price, safety, environmental outcomes and high-end technology. A responsive and supportive alternative fuel policy environment is one vital component to ensure success.

NGV Global advocates for, and works on behalf of, the international natural gas for transportation community.

David Perry is the Business Manager of NGV Global (www.ngvglobal.org).



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▲ TDC Steering Committee Member and Past Board Chair, Eric Amundsen (*left*) and PRCI President, Cliff Johnson (*right*) at the opening ceremony on July 15.

• Live technology demonstrations were offered as part of the TDC opening ceremony.

PRCI Opens New Technology Development Center in Houston for the Advancement of Pipeline Research

By Cliff Johnson

Pipeline Research Council International (PRCI) has officially opened its new Technology Development Center (TDC) in Houston, Texas. Less than a year after breaking ground, construction of the TDC has been completed on over eight acres, including a state-of-the-art pull test facility, an over 20,000ft² workshop and test facility with an additional 9,000ft². of office and meeting space.

The TDC is the result of a major commitment by the energy pipeline industry to address the key issues that it is facing to ensure the safety and integrity of the vital national and international pipeline infrastructure. It is a critical tool for the energy pipeline industry as we continue to strive for zero failures. The TDC will provide the industry with an independent third party site to fully understand the capabilities of current tools and to guide the development of




the new technologies needed to push toward that goal.

"The TDC enables efficient and timely access to industry samples in support of technology projects and programs," TDC Steering Committee member and Past Board Chair, Eric Amundsen stated. "The TDC is a success story in and of itself; there is no other similar or comparable collection in the world and will attract R&D efforts unique to the contained assets and capabilities."

PRCI hosted a grand opening celebration at the TDC on July 15 that was attended by over 200 PRCI members and industry stakeholders. Attendees had the opportunity to tour the building and warehouse including the state-ofthe-art pull test facility, as well as witness live demonstrations of technologies developed as a result of PRCI research. The grand opening of the TDC is an amazing opportunity for PRCI and its members. The TDC will shape the direction for PRCI and its members for years to come. With this new site, PRCI will be able to work closely with pipeline operators and solution providers to continue to enhance the tools that are needed to ensure pipeline integrity and safety and assist in the development of the next generation of tools.

The construction and development effort has been spearheaded by the PRCI TDC Steering Committee made up of PRCI members and staff who have been heavily involved in TDC operations since its inception and understand the incredible opportunities and benefits the pipeline industry can reap from its utilization. PRCI would like to acknowledge the members of the Steering Committee for their dedication and support, as well as the PRCI member companies that have and continue to contribute samples and sponsor the TDC's operations.

Cliff Johnson is the President of Pipeline Research Council International. For more information regarding the TDC please contact him at cjohnson@prci.org.



The TDC's pull test facility and custom-built winch which can pull over 5,000lbs at a rate of 5 m/s.

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- Promotion of the gas industry in France at national, European and international levels
- Supplier of services in the fields of standardisation and certification
- Exchange of information and expertise between gas players
- Develop and provide training courses with our Gas Techniques Training Centre, CFAFG





WGC 2015

This special section commemorates the 26th World Gas Conference, which was held in Paris, June 1-5. We start with a message from the outgoing President and overviews of the main conference and the Youth Event. Then we focus on women's place in the gas industry and gas as a transportation fuel before a summary of the reports of the committees and task forces.

WGC 2015 – The Gas World Meets in Paris

By Jérôme Ferrier

The French Presidency of IGU culminated in the 26th World Gas Conference, which was held in Paris, June 1-5 with the theme "Growing Together Towards a Friendly Planet". The four strategic guidelines or pillars of the French Presidency also acted as daily themes for the conference.

Tuesday June 2, 2015

Natural Gas as a Core Pillar for a Sustainable Future of the Planet – to obtain official recognition for natural gas as the destination fuel for sustainable development

The French Presidency emphasized the importance of gas advocacy and continued to improve IGU's gas industry advocacy program, emphasizing the merits of natural gas, developing consistent messages and promoting the need for research and investment as climate change continued to be a global issue. The conference programme featured sessions to tackle these issues and deliver the necessary messages.

Wednesday June 3, 2015

Gas, Renewables and Electricity: Together a Perfect Combination – to promote the appropriate mix of gas and renewables and electricity

The conference sessions which took place on this day addressed the fact that if gas is to provide a future source of "friendly" energy for the world population it needs to grow alongside renewables. The sessions further confirmed that a larger more integrated global gas industry is required to make the transition to a carbon neutral society.

Thursday June 4, 2015

Natural Gas as a Growth Factor for New Economies – to improve the availability of natural gas in new areas and developing countries

Day three of the conference focused on ensuring that the benefits of gas are spread as widely as possible and that gas is affordable, particularly when combined with renewables in emerging and new gas countries. Discussions and presentations confirmed that the industry needs to be ready for the new uses for gas that will arise in the future and their possible applications. It further highlighted that to drive gas sales in an increasingly environmentally conscious and cost sensitive world, the gas industry must leverage technology and innovation and target specific growth. Such growth will also need to identify and manage a range of new challenges and risks.

 Accompanying music for the WCG 2015 opening ceremony was provided by the symphonic orchestra of France's Republican Guard.





Friday June 5, 2015

Human Capital for the Future of the Gas Industry – to attract human resources and reduce staff turnover

On the final day of the conference the issue of human capital was discussed to address the major shortage of technical skills in the engineering and energy industries. Many questions were debated including, how does the gas industry interact with other industries? Do we need to collaborate or will commercial solutions be found? Should governments get together to promote technology training? What approach to human resources will provide the best solution for sustainable growth?

The submissions for the IGU Global Gas Award were made under the theme of "Sustainable development and innovative promotion of gas", and the award was presented in a special session on June 5.

The French Presidency included a Youth Event in the conference programme. The event attracted 150 young professionals and talented students from 35 countries. The programme was a great success and was created by a team of 10 young professionals.

The 26th World Gas Conference also included two new features to enhance the information and knowledge to be shared with the industry:

- The Natural Gas Vehicle Transportation Village featured an exhibition and free-toattend seminar programme covering a diverse range of topics;
- The delegate experience was further enhanced through new interactive tools including the use of Wisembly in over half of the conference sessions, to allow questioning to be easier than before. Additionally Poken was introduced to allow greater networking with other conference delegates.

In order to meet the challenges triggered by the oil price drop in October/November 2014, the French Presidency amended the programme to include two new sessions to tackle the surrounding issues:

- A Special Address on Natural Gas and COP 21 discussed how an international climate agreement must be confirmed at the COP 21 conference in Paris, November 30-December 11, 2015 to limit global warming to below 2°C;
- A Special Event on "The Energy Industry in Turmoil" debated the reasons for the sharp decrease in oil prices, the unclear energy policies in some areas and the lack of efficient mechanisms in place to limit CO₂ emissions. WGC 2015 attracted more than 3,700

participants from 91 different countries. Despite the poor economic situation, especially in the oil and gas world, the event was a great success. The exhibition showcased around 350 exhibitors over 17,121m², making it the biggest ever for a WGC, and was visited by more than 14,000 people. The quality of the discussions held and of the exhibition constituted a strong contribution to the future of our industry. It was a great honour for me to host his prestigious event. Thank you to all contributors.

Jérôme Ferrier was the President of IGU 2012-2015.

✓ From left to right at the WGC 2015 closing ceremony are members of the outgoing French team: Georges Liens, Coordination Committee (CC) Chair; Yves Tournié, CC Secretary; Jérôme Ferrier, IGU President; and Daniel Paccoud, NOC Chair.



EASTRING is a new pipeline project for Central and Southeastern Europe which represents an important step towards the Single European Market in the vision of the Energy Union.

The EASTRING project is a bi-directional gas transmission pipeline of annual capacity between 208,000 GWh to 416,000 GWh (ca. 20 billion m³ to 40 billion m³), extending from the Slovak border in Veľké Kapušany to the Turkish-EU border. EASTRING connects the existing gas infrastructure between Slovakia, Hungary/Ukraine, Romania and Bulgaria.

EASTRING offers direct and most cost-effective transmission route between Turkey and the rest of Europe. By offering the opportunity for diversification of transmission routes as well as supply sources it will enhance the security of supply in the broader Central-South Eastern Europe region. EASTRING will transport natural gas from different areas and alternative sources - It will bring gas from Turkish border to Europe (prospective Caspian, Middle East natural gas, LNG gas, as well as Russian natural gas flowing via Turkish territory) and also from European liquid gas hubs to Turkey. In the same time, it will provide South Eastern Europe with gas from European liquid gas hubs. The whole capacity will be available to any shipper or supplier.

The promoter of EASTRING is, among others, the Slovak Gas TSO EUSTREAM which is a modern company with a longstanding tradition and extensive experience in the transmission of natural gas. Transmission system of EUSTREAM comprises a reliable segment of the international transmission network and is one of the most important transmission routes for natural gas to Europe and the European Union. For more information see www.eustream.sk.





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of annual capacity in phase one

416,000 GWh (ca. 40 billion m³)

of annual capacity in phase two

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of all Balkan countries' and Romania consumption

846 – 1,029 km of gas pipeline length

according to the selected routing variant (SK 19 km, HU 102 km, RO 651/725 km and BG 257/0 km)

4 countries

in Central and Southeastern Europe connected directly



WGC 2015 – Global Perspectives on the Future for Natural Gas

By Alex Forbes

The WGC 2015 opening

ceremony.

IGU's triennial World Gas Conference (WGC) holds a special place in the calendar of the natural gas industry as the largest and most influential of its regular gatherings. WGC 2015, which was held in Paris, June 1-5, took on even greater significance than usual, coming as it did just months before the most important international climate talks in years: the UN Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP 21). Hopes are running high that these talks – which will also be held in Paris in the final weeks of 2015 – will lead to the signing of an international climate treaty that will come into effect from 2020. Any decisions made there will be crucial to the future development of the natural gas industry.

Following a gala reception in the Grand Palais on June 1, WGC 2015 was formally opened on June 2 by the outgoing IGU President, Jérôme Ferrier. Welcoming delegates he declared: "This conference is the moment to remind everyone of the important role gas can play in meeting energy and climate challenges. The time has come to state firmly that gas is not just a transition energy but should be the long-term basis for the world's energy mix."





The seniority of the keynote speakers who attended the event, and the messages that they chose to impart, were a powerful testament to that. The leaders of the world's biggest energy companies took the opportunity presented by WGC 2015 to reaffirm their faith in natural gas being the "fuel of the future" – potentially growing to become the largest source of primary energy by 2050, in a world that will still depend heavily on fossil fuels, despite the rapid growth of renewable energy sources. The consensus was that gas would grow by around 2% per year – a higher figure than most recent energy outlook projections – to become the biggest fossil fuel from about 2040 onwards.

Will COP 21 be a turning point in awareness?

The CEO of Total, Patrick Pouyanné, told delegates: "It is my wish that ... COP 21 later this year ... shows a real turning point in the international awareness of the role that natural gas has to play in satisfying global energy needs as well as constituting a key element in combating climate change."



Gérard Mestrallet, Chairman & CEO of Engie, stressed the importance of a meaningful agreement being reached at COP 21: "Along with many other members of the business community, we wish that there be a clear multilateral agreement to restrict global warming to 2°C. I have the conviction that it's in companies' interests to have a clear, stable framework rather than no agreement at all – because no ▲ Gérard Mestrallet, Chairman & CEO of Engie (*left*), Jérôme Ferrier, IGU President (*centre*) and Anita George, Senior Director of the World Bank Group's Global Practice on Energy and Extractive Industries (*right*) opening the WGC 2015 exhibition.





◀ Patrick Pouyanné, CEO of Total.

◀ Gérard Mestrallet, Chairman & CEO of Engie.



Peter Coleman, CEO of Woodside Energy.

agreement at all would be synonymous with uncertainty and possibly chaos."

It used to be assumed by the industry that the many seemingly obvious benefits of natural gas would guarantee its place as a major contributor to the global energy mix in an increasingly carbon-constrained world. Because of its chemical make-up – four atoms of hydrogen to one of carbon – gas is the least polluting of the fossil fuels, in both its impact on climate change and its contribution to local pollution in cities. It is as close as you can get to a hydrogen-based economy before leaving that final atom of carbon behind.

For example, when gas combusts, the hydrogen combines with oxygen to form harmless water vapour, so it forms much less carbon dioxide than oil or coal per unit of energy produced. Once processed for use, it also contributes virtually no oxides of sulphur (SO_x), lower volumes of oxides of nitrogen (NO_x), and only trace volumes of carcinogenic particulates. Gas turbines are extremely good at loadfollowing, and so make managing demand variations more straightforward than most other types of electricity generation, especially intermittent renewables. And modern combinedcycle gas turbine (CCGT) power plants operate at conversion efficiencies of up to around 60%, and even higher if used in a combined heat and power (CHP) configuration.

Not-so-obvious benefits

Yet at WGC 2015 the over-riding message from speaker after speaker was that the role of natural gas in the future energy mix can no longer be taken for granted. The benefits of gas that are so obvious to the industry are often poorly understood by those outside it – crucially policymakers and campaigning non-governmental organizations (NGOs). Natural gas is often lumped in as just another fossil fuel, along with oil and coal.

In a speech that centred on the opportunities for gas presented by the pollution problems of Asian mega-cities – where the immediate local pollution benefits of gas often outweigh its greenhouse gas (GHG) emissions advantages in the minds of policymakers – Woodside Energy's CEO Peter Coleman lamented the industry's track record of promoting the benefits of its product to the wider world:

"The recent boom in natural gas production in the US, for instance, contributed to a 3.8% drop in carbon emissions in 2012 alone. We also know that for every tonne of GHGs emitted in the production of LNG in Australia, at least four tonnes of GHG emissions in customer countries are avoided when LNG is used to displace coal-fired power generation. So while coal is at face value cheaper than gas, the full life-cycle costs of coal versus natural gas are much greater.

"Our industry has historically been too timid to aggressively address the shortcomings of coal – but now is the time for us to stand up, and we need to stand united. We in the gas sector must do more to highlight the benefits of gas over the product of our competitors. Give me a break: who coined [the phrase] "clean coal"? And why did we let that happen?"



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Bob Dudley, CEO of BP.

The role that gas should play in the mitigation of climate change was a common theme of many presentations, with one of the most thought-provoking contributions coming from BP's CEO, Bob Dudley. Whilst acknowledging that renewable energy sources have a crucial role to play in decarbonizing the world's energy economy – especially as their costs continue to decline, making them increasingly competitive with other energy sources – Dudley reminded delegates that their potential contribution needs to be seen in the right context.

"Because of the relative scale of coal versus renewables in today's power industry," he said, "if we were to switch just 1% of total power generation from coal-fired power plants to gasfired power plants, that would cut emissions by an amount equal to increasing all of renewable energy production by 11%."

The harsh realities that the natural gas industry faces are nowhere clearer than in Europe, where demand for gas has plummeted since 2010, pushed out of the energy mix by cheap coal (some of it displaced from US power generation by shale gas, ironically) and heavily subsidised renewables. As Engie's Mestrallet said: "European utilities have decided to close down almost 50 GW of gas-fired power stations, equivalent in power to 50 nuclear stations." And these are mostly modern, "world-class" plants.

Calling for meaningful carbon pricing

It was no coincidence that the CEOs of six of the world's largest international oil and gas companies – Shell (Ben van Beurden), BP (Bob Dudley), Total (Patrick Pouyanné), Eni (Claudio Descalzi), Statoil (Eldar Sætre) and BG Group (Helge Lund) – chose the day before the opening ceremony of the conference to publish a joint statement calling for the introduction of carbon pricing around the world, along with "clear, stable, ambitious policy frameworks that could eventually connect national systems". Calling out to governments and to the UNFCCC, they said:

"Our industry faces a challenge: we need to meet greater energy demand with less CO_2 . We are ready to meet that challenge and ... we firmly believe that carbon pricing will discourage high-carbon options and reduce uncertainty that will help stimulate investments in the right low-carbon technologies and the right resources at the right pace."

Four of these CEOs then turned up in Paris at WGC 2015 to give keynote speeches in which their joint statement got a special mention in their presentations. This is hardly surprising because, while these companies are generally referred to as "international oil companies", most of them are either already bigger producers of gas than oil or soon will be.

Shell is already a bigger producer of gas than oil; Total's Pouyanné said his company's gas production had risen from 35% of total output 10 years ago to 50% today; while BP's CEO, Bob Dudley, said "today gas accounts for around half of BP's upstream production globally ... and it won't be long before gas is in the 60% range in our portfolio". All these CEOs



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 Isabelle Kocher, Deputy CEO of Engie.

> believe that meaningful carbon pricing would enable gas to be much more competitive than it is today, especially against its main rival in electricity generation: coal.

> What was abundantly clear in Paris was that a great deal of uncertainty hangs over the industry, especially from policy developments and potential impacts from disruptive technologies. In particular, as Engie Deputy CEO Isabelle Kocher focused on in her presentation, industry players need to play close attention to the "energy transition" that is currently under way.

Describing the transition as a "revolution without precedent, triggered by a change of mindset and supported by a revolution of technologies" she said: "The energy transition wasn't managed the right way in Europe ... and it's clear for the moment that the results for European countries, players and citizens is poor – poor from an environmental point of view, poor for cost competitiveness, and even poor from a security of supply point of view." A large part of the problem in Europe stems from the failure of the vaunted Emissions Trading System (ETS) to provide meaningful carbon price signals to guide energy investments.

A key feature of this transition will be the growth of decentralised energy systems, with examples including off-grid utilisation of renewables such as wind and solar, often in combination with storage technologies – currently in their infancy but the subject of much R&D – and distributed generation using micro-turbines and fuel cells, both of which present opportunities for natural gas. There was also much discussion of the opportunities opening up for natural gas in new markets, such as transportation, traditionally the fiefdom of oil products.

Much discussed, interestingly, was the potential for the renewables industries and the gas industry to work in partnership rather than seeing themselves as competitors. For example, the CEO of KOGAS, Jong-Ho Lee, told delegates: "Renewables are ideal sources for the environment. However, we have seen from examples earlier [Europe's experience being one of them] that they cannot make impacts by themselves alone. A balanced combination of renewables and gas together is the only effective way to boost clean energy supply at much less cost over the long term."

How should gas secure its future?

So what should the industry be doing to secure its future? Many of the suggestions made by speakers at the conference chimed with recommendations in a report launched at WGC 2015 by the IGU looking at "the key developments that will shape the gas market in 2050" (see box on p89).

A common theme was that the industry needs to work much harder to promote the advantages of gas over other fuels to decisionmakers so that an appropriate policy environment emerges – whether that be carbon pricing as proposed by the six oil and gas majors in their joint statement, or capacity mechanisms as proposed by, among others, Gérard





Mestrallet. Gas advocacy has been gaining momentum, thanks largely to the efforts of IGU, but much more needs to be done.

As ExxonMobil's Chairman & CEO, Rex Tillerson said: "We must engage the public and





GCPARIS2015

policymakers to emphasize how the energy sector leads many of the most promising efforts to pioneer technologies and techniques. We must communicate that sustainable technologies require sustainable investment. And sustainable investment requires sound, stable policies."

Related to the need for better advocacy is the need for the industry to reduce its environmental impact as much as possible. Both Shell CEO Ben van Beurden and BP CEO Bob Dudley stressed the need for the industry to reduce the climate impact of its operations, through the reduction of fugitive methane emissions in the production and transportation chain, and by minimizing flaring. Indeed, a number of conference sessions were dedicated to carbon capture and storage, in connection with both gas production and gas-fired power generation, and moves to reduce gas flaring and venting including the World Bank's Zero Routine Flaring by 2030 initiative. Meanwhile, in a special address, the French Vice Foreign Minister, Christian Masset, called on companies in the gas industry to help make COP 21 a

◀ Jong-Ho Lee, CEO of KOGAS.

Ben van Beurden,
 CEO of Shell.

Rex Tillerson, Chairman
 & CEO of ExxonMobil.



IHS Vice Chairman Dr Daniel Yergin took part in a special debate entitled "Energy Industry in turmoil" with Marcel Kramer, IGU Regional Coordinator for Russia, the Black Sea and Caspian Area.

success by making public commitments to reduce emissions.

The issue of cost was a big theme, not least on the part of the Paris-based IEA, which took the opportunity of WGC 2015 to launch its annual Medium-Term Gas Market Report, which makes forecasts five years ahead. "One of the key – and largely unexpected – developments of 2014 was weak Asian demand," said Executive Director Maria van der Hoeven. "The experience of the past two years has opened the gas industry's eyes to a harsh reality: in a world of very cheap coal and falling costs for renewables, it was difficult for gas to compete."

On the same theme, Shell's Ben van Beurden and Statoil's Eldar Sætre emphasized the need for the industry to reduce production costs so that gas becomes more competitive against other fuels. "Frankly, the cost trends that our industry has experienced over the last two decades are simply unsustainable," said van Beurden. "To realise the benefits of natural gas the industry must tackle the cost issue ... an important role will be played by standardization rather than bespoke solutions," said Sætre Chevron's Chairman & CEO John Watson agreed, highlighting the LNG sector, "we need new approaches to developing the next wave of LNG" and declaring, "the global economy needs affordable energy".



Eldar Sætre, CEO of Statoil.

Growing business for ever-growing energy needs



Natural gas is fast emerging as the 'fuel of choice' across the world, especially in developing countries like India. As India's largest commercial enterprise with business interests in multiple forms of energy supply and distribution, IndianOil has been expanding its customer base in gas – large industrial customers, gas-based power plants, refineries, etc. – for over a decade by leveraging its inherent strengths and countrywide reach. With decades of expertise in cryogenic vessels, the Corporation offers customised solutions to bulk users located away from gas pipelines through its innovative 'LNG at the doorstep' initiative. As co-promoter of PLL (Petronet LNG Ltd.), which has set up LNG import terminals at Dahej and Kochi, the Corporation has marketing rights for 30% of the LNG procured by PLL, and is also sourcing more quantities of LNG directly. Considering the burgeoning growth of natural gas as a substitute fuel, IndianOil is expanding its gas infrastructure and associated pipeline networks, and is setting up a 5-million tonnes per annum LNG import terminal at Ennore near Chennai. The Corporation is currently setting up city gas distribution networks in several geographical areas jointly with consortium partners, and is committed to total fuel solutions for households, transport systems and industries.



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- ▲ John Watson, Chairman & CEO of Chevron.
- Beate Raabe, Secretary
 General of Eurogas.

► David Carroll became President of IGU at the close of WGC 2015.

 The baton passed to incoming IGU President David Carroll at the closing ceremony.

In a Strategic Panel entitled "How natural gas can raise its voice", delegates were asked to vote on whether the voice of the gas industry was loud enough, too loud or too soft. Almost four-fifths of those present, 78%, opted for too soft – a clear message that more advocacy is needed. But content matters too.

As the Secretary General of the Eurogas trade association, Beate Raabe, said: "How can gas raise its voice? I don't think the important thing is how loud the voice is; the important thing is: what gas is saying. And that differs depending on where you are in the world: gas is in a very different situation whether you are in the US, in Europe, or in Asia ... gas is facing challenges in all three of these areas ...

"If we rub the EU politicians' noses into the fact that the share of coal has risen, that emissions have not gone down as much as they could have done without the coal revival, then you get very embarrassed looks, because everybody is aware of that. But if you help the politicians in the member states to reach their goals – with gas – then that's a different story. And we can do that by showing how gas can help in power generation, and how gas can help in heating, by being complementary to intermittent renewables."

The importance of gas advocacy was one of the themes of the incoming IGU





President, David Carroll's address in the closing ceremony: "The next transitional shift for us is becoming a more concise and impactful advocate. Not just a mouthpiece but rather a developer of the practices, the policies, the scientific information on which enlightened policy is going to be developed in the future."

Alex Forbes is an independent journalist and consultant who has been reporting on energy developments and analyzing trends for three decades.

Comparing Primary Energy and Natural Gas Projections to 2050

One of four reports launched by IGU at WGC 2015, "Prospects for Natural Gas" examines the key developments that will shape the gas market in 2050. Its starting point is to look at scenarios put together by three influential organizations well known for their energy projections – the International Energy Agency (IEA), the World Energy Council (WEC) and Shell – and to compare the projected outcomes.

Figure 1 shows actual primary global energy demand in 2012, and the various projections made to 2050. The dotted lines are three scenarios formulated by the IEA in its 2014 Energy Technology Perspectives report and correspond to outcomes of global temperature rises of 2°C, 4°C and 6°C.

"On average," says the IGU report, "the investigated scenarios show total primary energy demand in 2050 of 820 exajoules (EJ) (equivalent to 410 million b/d of oil or 21,320 bcm/year of natural gas). This is 50% above current levels and equivalent to a compound annual growth rate of 1.1%." The figure is slightly above the IEA scenario projecting a global temperature rise of 4°C.

The report comments that "there are no substantial differences" between the older scenarios (published in 2010 or before) and the newer ones. (The older ones are Shell Blueprints, Shell



Figure 1.



Figure 2.

Scramble, IEA Baseline and IEA Blue Map.)

Figure 2 examines what the scenarios project for natural gas demand by 2050. "In this case," says the report, "the more recent scenarios show a much larger demand for natural gas (210 EJ on average) than the older ones (130 EJ). This is likely triggered by the unconventional gas revolution."

Demand of 201 EJ (5,460 bcm) by 2050 implies an annual growth rate of 1.5%. This, says the report, "is comparable to the outcome of the IGU scenarios for 2050 ... presented at the World Gas Conference in 2012".

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ADGAS' operational core is the gas liquefaction plants on Das Island as well as the facilities for gas export to onshore. Facilities for gas liquefaction consist of three LNG trains with the capacity to produce around eight million tonnes of LNG, LPG, paraffinic naphtha, and molten sulphur for export. For gas export to onshore, its facilities include five gas processing trains, with capacity to dehydrate and compress one billion standard cubic feet of gas daily and send it through a subsea pipeline to facilities in Habshan.

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A Wide-Ranging Agenda for WGC 2015

By Georgia Lewis

Once the glitter settled on the glamorous WGC 2015 gala reception in the Grand Palais, serious global issues came to the fore. Gas advocacy, ensuring energy security and eliminating energy poverty while meeting increasing demand, mitigating climate change, partnering gas with renewables, reducing dependence on coal and the limitations of EU energy policy were all on the agenda.

 WGC 2015 started with a gala reception in the Grand Palais.

The exhibition hall, with impressive stands from energy companies and suppliers from across the world, proved to be a place for positive networking. Having all exhibitors under one roof made it easy for exhibitors and delegates to mingle, and the often-lavish stands were a good indication that companies are prepared to invest in the promotional opportunities that come with events such as the WGC.

In his opening ceremony address, outgoing IGU President, Jérôme Ferrier described the conference as "a wonderful opportunity to ensure that the vital contribution natural gas is making to secure a sustainable future for our planet is more widely understood and appreciated".





The importance of gas as a force for social and economic development in a low-carbon world was emphasized by Ferrier. He set the tone for a conference that would focus on gas advocacy, with the need for the industry as a whole to better communicate its message underpinning multiple sessions during the week.

"We need to reach out more effectively to communities that are affected by gas development and listen to their concerns and aspirations so that better-informed decisions are made about our planet's energy future," said Ferrier.

There was, however, a sense of frustration that the gas industry is not playing a bigger role in the global energy mix. Maria van der Hoeven, IEA Executive Director, told the conference that the "golden age" of gas is benefiting some countries more than others.



 Maria van der Hoeven, IEA Executive Director.

 The WGC 2015 exhibition featured an array of impressive stands.





 Sheikh Khalid bin Khalifa Al-Thani, CEO of Qatargas.

> "While the promise of a golden age of gas has arrived for some countries and continues to be a tangible possibility for others, it has all but evaporated elsewhere," said van der Hoeven.

Energy security

The realities of increased energy demand and the ongoing challenges of energy security and eliminating fuel poverty were consistently highlighted across a wide range of presentations during WGC 2015.

With the *IEA World Energy Outlook 2014* reporting that globally 1.3 billion people do not have access to electricity and 2.7 billion people rely on biomass fuels for cooking, the challenge of overcoming fuel poverty is enormous. As well as ensuring energy security and developing the energy sector sustainably, it became increasingly clear over the course of the conference that while the gas industry is keen to meet the challenges, it needs support from policymakers and better engagement with communities. Sheikh Khalid bin Khalifa Al-Thani, CEO of Qatargas, told the conference: "No energy portfolio can be considered reliable without natural gas".

The importance of the growing global trade in LNG and development of the necessary infrastructure was another ongoing theme throughout the conference. Speakers from around the world were generally upbeat about the future of LNG projects, with global LNG supplies forecast to keep growing over the next 20 years and growth being strongly driven by the Asian market.

However, van der Hoeven cautioned that in the present market conditions with low oil prices LNG projects may be a "soft target for investment cuts" because of their capital-intensive nature and the long lead times involved.

On the pipeline front, Bob Dudley, CEO of BP, spoke enthusiastically about projects covering Europe, Asia and North America and their potential to bring energy to more people.



"All of this is creating a more integrated global market for gas," he declared.

Reduction of gas flaring and using technology to harness this wasted resource was another ongoing issue discussed at the conference. Anita George, Senior Director of the World Bank's Global Practice on Energy and Extractive Industries, put the issue into stark perspective when she said that if the flared gas was used for power generation, "it could provide about 750 billion kilowatt hours of electricity, or more than the entire current annual energy consumption in Africa".

Despite the enormity of this challenge, positive moves towards reducing and ending routine flaring were shared with the conference. Additionally, a DNV GL presentation outlined the company's work from the past year in regard to creating value from flared gas. Martin Layfield, global gas segment director for DNV GL, said that while the project is going well, the main challenges are a lack of regulation and the need for technology players to appeal strongly to operators to promote solutions that are cost-effective.

Other projects which are expected to improve access to energy, particularly in developing countries, were also cited at the conference as examples of positive contributions by the gas industry. These include a deal between Italian company, Eni, and the stateowned Egyptian General Petroleum Corporation to explore and develop resources in Sinai, the Nile Delta and the Gulf of Suez.

Jean-Marie Dauger, Executive Vice President of Engie, cited China, India and South-East Asia as places where positive steps have been taken to diversify the energy mix, including increased use of gas. He took a global, broad-based approach to developing emerging energy markets during his keynote address. He said that across emerging economies, a long-term vision, proper regulatory regimes that are favourable to investors, confidence and reliability are all essential for meeting growing demand.



 Anita George, Senior Director of the World Bank's Global Practice on Energy and Extractive Industries.

Mitigating climate change

There was much discussion of the role the gas industry can play in mitigating climate change and moving towards low-carbon economies across the world. In particular, there was widespread criticism of the ongoing use of coal in multiple markets instead of natural gas as a logical partner for renewables.

Eldar Sætre, CEO of Statoil, captured the mood of the conference during his keynote address when he spoke about the potential of natural gas to mitigate climate change globally.

"The world is a better place, it's a cleaner place, and also a cooler place if we can produce more gas and replace growing demand for coal," said Sætre. "Unfortunately the view that gas is part of the solution is not recognized and shared by everyone."

The comments of Woodside's CEO, Peter Coleman, on the myth of clean coal during his keynote address garnered international attention. He asked the rhetorical question of who coined the phrase "clean coal" and called



• Li Yalan, Chair of the Board of Directors of Beijing Gas Group.

for the gas industry to be more outspoken on the issue of coal dependency.

Patrick Pouyanné, CEO of Total, urged delegates to fight the heavy use of coal in his keynote address at the conference's opening session, and recommended carbon price mechanisms to enable coal to be replaced by natural gas in the worldwide energy mix.

Other leaders in the industry echoed Pouyanné's sentiments, including Gérard Mestrallet, Chairman & CEO of Engie. "Gas is an energy of the future and is a strong point in the decarbonization of our economy," he said.

Li Yalan, Chair of the Board of Directors of Beijing Gas Group, told the conference about China's shift away from coal and towards increased gas use. China is the world's third largest natural gas consumer, despite gas only comprising 6% of the country's energy mix.

"Chinese energy consumption is shifting gears to low-carbon consumption," said Li. "The new normal of the Chinese economy brings challenges but also opportunities for the gas industry."

The issue of carbon pricing as a means of combating carbon emissions was widely

discussed with the open letter from six leading European energy companies to the UNFCCC Secretariat bringing the issue of carbon pricing to the fore in Paris as well as in the international media.

The open letter was signed by the heads of BG Group, BP, Eni, Shell, Statoil and Total and published in the *Financial Times* on June 1, which proved to be very timely for conference discussion. Maria van der Hoeven urged all major players in the energy industry to back the stance taken by the signatories. She told the conference the letter is "important" especially in terms of changing the perception of the energy industry as being part of the problem rather than part of the solution.

EU policy limitations

Europe's excessive use of coal and heavy subsidies for renewables were mentioned repeatedly across the conference as reasons for holding back a European golden age of gas. There were calls for EU policymakers to investigate the possibility of reversing hydraulic fracturing bans as well as much discussion about carbon pricing. With the conference





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Gertjan Lankhorst,
 CEO of GasTerra.

being held in Paris and COP 21, the annual UN climate change summit scheduled for the end of the year in Paris, EU policy issues were a constant point of discussion across multiple topic areas.

In his keynote address, Dudley summed up the main geopolitical issue affecting the EU gas market: "As well as Europe needing gas from Russia, Russia needs revenues from Europe. In 2013, Russian earned \$73 billion from gas sales, mostly from the EU. This mutual dependency has kept supplies flowing since the Cold War, through many times of tension. Energy can act as a bridge between countries."

While Dudley highlighted the benefits of the EU-Russia gas relationship, he also highlighted the need for Europe to diversify its supplies and become a more gasfriendly region.

ExxonMobil's Chairman & CEO, Rex Tillerson reiterated Dudley's words and called for the EU to open up access to gas and apply "proven technologies", such as hydraulic fracturing, so that European and global markets can "capture the benefits of increased energy diversity, flexibility and security."

Eldar Sætre called on the EU to heed the US example: "The US has already been a pioneer in replacing coal with gas and now it is time for Europe to follow."

Looking ahead

As the conference wound down, the focus shifted towards COP 21 and how agreements reached during the conference might impact on the energy industry. Many business leaders in energy as well as other sectors have called for ambitious carbon pricing agreements to be made at COP 21.

In his closing address, David Carroll, the incoming IGU President, acknowledged that there is no "IGU-wide" carbon pricing policy and seeking common ground between the proand anti-carbon pricing camps is required. He said that carbon pricing is "one way to provide an incentive to decarbonize the energy mix" but added that it was not the only solution.

Gertjan Lankhorst, CEO of GasTerra, gave a keynote speech which urged delegates to step back and see the big picture to ensure that gas remains a primary source of energy and continues to grow.

He said that the gas industry should focus on reducing carbon emissions without jeopardizing energy supply and economic development.

Lankhorst also offered some advice for the next WGC, calling for more government representatives to be present so they can hear the case for gas: "I believe that next time in Washington D.C. in 2018, we should seek the presence of ministers from all over the world – it is the perfect event to engage with them because our industry wants to be heard and social pressure is very powerful."

Georgia Lewis is the Managing Editor of International Systems and Communications.



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WGC Youth Event Highlights Opportunities and Challenges

By Marc Mopty and Eirini Ore

IGU President Jérôme

delegates to the WGC

Ferrier welcoming

2015 Youth Event.

The role of gas in sustainable development, and attracting and retaining young talent in the gas industry were the two main topics of the WGC 2015 Youth Event. With 150 young professionals and students from 35 countries and 40 different companies and universities taking part, the young delegates were offered an inspiring and engaging programme designed to



highlight the career opportunities and challenges the gas industry offers young people. The activities in Paris built on the success of the first WGC Youth Event in 2012 in Kuala Lumpur.

The first objective was to challenge participants to illustrate solutions and develop projects for energy transition from the perspective of sustainable energy. The second objective was to raise awareness about the latest human resources trends in the gas industry and spark the creativity and imagination of participants from a marketing point of view.

An interactive programme of conferences, workshops and networking opportunities was developed by a team of young professionals under the auspices of IGU's Human Resources Task Force. The event started with an icebreaking evening on June 2, which was sponsored by Engie. This was followed by three full days from June 3-5 sponsored by Total, the Malaysian Gas Association and Beijing Gas Group respectively.

While the programme for the Youth Event was intense and demanding, social activities were also an important part of the schedule, including free time in the evenings to enjoy Paris. Social activities during breaks in proceedings included creating avatars with 3D printing, playing with drones, leaving messages in the digital guest books and quizzes with prizes.

Opening event

The ice-breaking evening was designed to encourage the participants to get to know each other. After welcoming speeches by Jérôme Ferrier, IGU President, and Agnès Grimont, Chair of IGU's Human Resources Task Force, a cocktail cruise on the River Seine offered the event's



first networking opportunity against the backdrop of the beautiful cityscape of Paris.

Henri Ducré, Executive Vice President of Engie Group Human Resources was our VIP guest on board. He initiated a creative discussion about workforce trends in the gas industry and held a question-and-answer session on career opportunities for young people.

Career opportunities

The first plenary session, held on June 3, opened with the contribution of Jacques-Emmanuel Saulnier, Head of Corporate Communications at Total. He highlighted the vital role of gas in sustainable development and improving access to energy for all. This was also an important topic at the workshop sessions.

The keynote speaker on the second day of the youth event, Marina Taib, Country Chair of Petronas Carigali Brunei Ltd, emphasised the rewarding career opportunities of the gas industry as well as the need for young, motivated, talented people. She referred to her personal experience in her address. Lixin Che, President of Beijing Gas Group Research Institute, the keynote speaker on the third day, took a different approach and challenged the audience about ethics, respect and commitment.

In addition, 15 guest speakers, representing the sponsors Engie, TIGF, GRTgaz, the American Gas Association and GTI, led small group discussions. Topics discussed included: case studies of best practices from the guest speakers' companies; creative ideas for workshop development; and how to succeed in the gas industry. The participants benefited from the speakers sharing their personal experiences, raising awareness of the different career paths the gas industry can offer.

The online Wisembly interface was used enthusiastically by the young delegates during the main sessions. Questions, answers and comments were published live to facilitate debate. The small group format for the discussions fostered an environment of closeness



and honesty, and the opportunity to raise personal questions about career prospects and decisions was taken by many participants.

Workshop sessions and competition

A significant part of the programme was dedicated to a competition in which participants formed groups of six-to-eight people and were given workshop topics to explore. The groups had to propose solutions to the industry challenges raised by these topics, and prepare presentations supporting their ideas for juries



▲ The cocktail cruise on the River Seine was a chance for people to get to know each other.

 Marina Taib, Country Chair of Petronas Carigali Brunei gave the keynote address on the second day.



 Participants working on team projects in one of the workshop sessions. made up of experienced WGC delegates. In the first round, 18 teams competed and the juries named one finalist from each of the four workshops. The juries looked for original ideas, synergies, pragmatism, risk-taking and enthusiasm. The four finalists presented their work at the closing ceremony of the Youth Event.

The workshop content was developed around four focuses that reflected the youth event's main objectives: response to energy transition; local access to sustainable energy; marketing of the industry; and the industry of tomorrow.

Five groups worked on energy transition, proposing concrete solutions and innovations surrounding five relevant issues.



The local access to sustainable development workshop attracted five groups tasked with developing projects to deal with technical, societal, governmental and economic issues and underline the role of gas in sustainable development to convince potential investors.

For the marketing workshop, four groups created and presented advertisements to attract young people into the gas industry. Finally, for the industry of tomorrow workshop, four more groups proposed realistic future resolutions about the industry of tomorrow and for the jury.

Many experienced professionals volunteered to contribute as facilitators to support the groups to develop ideas and present solutions in a meaningful way. Management advice, approach guidelines and presentation coaching were offered by the facilitators to help participants research efficiently and prepare presentations. The groups demonstrated commitment, creativity and thoroughness, presenting high quality work to a jury despite tight deadlines.

Closing ceremony

The closing ceremony of the Youth Event started with an address by Vincent Defourny, Director for Strategic Partnerships at UNESCO. He said that UNESCO, which has signed a Memorandum of Understanding with IGU, is keen to support such events as two of the organisation's main aims are to promote science and education.

During the ceremony, the four workshop finalists presented their work and the audience voted for their favourite group via the Wisembly interface. Voting was very close with the result being determined in the last seconds of the online poll.

The winning team was from the energy transition workshop and their presentation was about the contribution of gas to energy transition in transportation. They presented outcomes based on feedback interviews with WGC exhibitors and delegates, and were praised for

 Vincent Defourny, Director for Strategic
 Partnerships at UNESCO addressing the closing ceremony.



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The winning workshop team from left to right: Adrian Sookhan, Thomas Abraham, Vincent Lheure, Homa Kargar, Simon Levet, Marco Galliani, Kamila Hammi and Elena Malkina.



thorough examination of their project and excellent communication skills.

Feedback

During the Youth Event, many participants met with the French team that organised the main conference as well as VIP delegates. A highlight was the spontaneous participation of Maria van der Hoeven, Executive Director of IEA, who spoke to Youth Event participants and took questions about current events and energy geopolitics. The young people felt involved and engaged in the conference while enjoying high visibility, networking opportunities and peer interaction.

The Youth Event was a positive and empowering experience for the young professionals and students who attended. It represented a change for young people, who have often felt that they were kept away from important industry and corporate events where they would be able to network with senior executives and experts. During the Youth Event, the participants had the opportunity to be the centre of attention, interact and develop their personal networks.

In particular, the participants benefited from learning about the variety of career paths the gas industry has on offer. The Youth Event was a unique experience for the young professionals and students as well as for the more senior delegates who had the chance to meet the industry's future decision-makers and stakeholders.

Marc Mopty of GRTgaz was the Project Manager of the WGC 2015 Youth Event and Eirini Ore of Engie was a member of the organising team.



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Women's Place in the Gas Industry

By Georgia Lewis

Attracting women into the fields of science, technology, engineering and mathematics (STEM) has been a challenge and a priority for numerous companies and governments. The gas industry is no exception and many of the issues faced by companies, educational institutions and governments were addressed at the WGC 2015 strategic panel session, "Women's place in the gas industry".

 The strategic panel session on women's place in the gas industry was chaired by Marie-José Nadeau, Chair of the World Energy Council. Chairing the session, Marie-José Nadeau, Chair of the World Energy Council, gave an overview of the challenges in relation to access to energy and the proportion of women in senior executive positions. "Currently, 1.1 billion people do not have access to energy and we are not on the right path to eliminating energy poverty – this affects healthcare, education, sanitation, economic growth and job creation [and there is a] risk of social and political disruption," she declared.

She said that the mixed effects of low oil prices, such as a fall in revenue and lower prices for consumers, add to the challenging time for the energy industry and that the "effects are complex and vary from country to country".

"Many actors and multiple solutions need to be involved in the elimination of energy poverty and this requires a diversity of voices," Nadeau said.




"Of 7 billion people, 49.6% are women – we must reach out to them at all levels. This will improve quality of life. It is misleading to only focus on poor countries and emerging economies."

Nadeau reflected on promotion and retention rates for companies which she said are "insufficient for gender diversity". She cited multiple "conscious and unconscious biases" for this, including: educational disparities, cultural norms and the double burden of work and domestic responsibilities. Antidiscrimination laws, support for child and elder care, mentorship programs, "clear, visible commitment from governments and top management", good workplace behaviours and recognising the value of half the world's labour force were put forward by Nadeau as solutions.

"Diversity offers strength in leadership," she said. "By 2015, statistics don't lie, the link between female participation and economic growth is clear."



The need for more women in the gas industry

Thea Larsen, CEO of the Danish Gas Technology Center, posed the question "Do we need the women?" and answered resoundingly in the affirmative. ▲ Thea Larsen, CEO of the Danish Gas Technology Center (*left*) and Sandra Lagumina, CEO of GrDF.





Debra Reed,
Chairman and CEO
of Sempra Energy.

of change in the gas industry, with challenges such as security of supply, access to energy and climate change, "we need to reform our business and the way we work".

She said that because of the global scale

Women need to be part of this reform, according to Larsen because "[we need] the right people on board and we cannot

discount 50% of the talent pool. We need to act differently – if not, then business solutions will not do the job. Management needs to be willing to provide a fair and equitable environment."

Sandra Lagumina, CEO of GrDF, said that it is "crucial to have women in the company [because] company people should not be different to your clients and diversity gives you a competitive advantage".

Educational obstacles

Debra Reed, Chairman and CEO of Sempra Energy, told the conference it is important to "get girls studying a math/science curriculum". She quoted the John versus Jennifer study, which was conducted by Yale University in 2012. Researchers sent identical applications, where the only difference was a male and female name, for a science-based job to male and female professors who were asked how much they would pay each candidate and whether they would be willing to mentor them. The study found that both male and female professors were biased towards the male student, less likely to mentor the female student and recommended a salary for the female that was 15% less than the male.

Additionally, the attrition rate of girls in STEM careers is a concern, according to Reed, with one-quarter of STEM jobs taken by female graduates in the US but after 10 years, half of those young women either leave the workforce or do not stay on in the field.

"Girls in non-traditional fields need support, encouragement and mentors, either men or women," said Reed. "You cannot be what you cannot see."

Li Yalan, Chair of the Board of Directors of Beijing Gas Group, also highlighted the importance of visibility and awareness of what women can do in the gas industry. She cited the example of the torch at the opening ceremony of the 2008 Beijing Olympic Games, a Beijing Gas Group project that involved 30%

 Li Yalan, Chair of the Board of Directors of Beijing Gas Group.



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female employees but they were not seen widely by the public.

Larsen said the recruitment drive needs to begin before women graduate: "More women are going into higher education; we need to start the fight for talent very early."

Lagumina agreed with Larsen and said that with the number of women in technical jobs still low, girls need to be educated about the range of jobs available in STEM fields. She also echoed Reed's sentiments on the importance of mentorship by both men and women.

Encouraging women to work in gas

Elena Burmistrova, CEO of Gazprom Export, told of how she studied English literature at university and ended up working in the gas industry: "In my younger days, I didn't dream of this, I didn't perceive the benefits of working in gas, it all came later."

The fall of communism was a turning point for Burmistrova as she witnessed "tectonic shifts in Russia".

"Almost overnight, there was a free market, rules changed overnight," she said. "I made the choice to go into business and face the ups and downs of our industry."

"Oil and gas is traditionally a man's business in Russia – I was young, female and blonde and not taken seriously but now I can see the balance in gender has changed a bit." Burmistrova told the conference that Gazprom has a policy of promoting women with different qualifications and backgrounds. The workforce is multicultural and one-third of the staff are women.

Agnès Grimont, Performance, Innovation and New Business Senior Vice President at Engie and the Chair of IGU's Human Resources Task Force, asked whether women need to review their attitude towards themselves or whether men need to review their perception of women. "Both attitudes have to change and be supported by top management and governments," she said, adding that there has been a lot of discussion about these issues for a long time and now women are impatient for change.

"We need to take advantage of technology to create a more friendly working environment," said Li, referring in particular to using the internet to enable women to work from home when possible.

Larsen said that it is important to "be specific, not general" and to "make opportunities visible, consider people already in the industry, recruit from within [and] when looking outside, demand a percentage of female candidates from headhunters".

To senior women in the gas industry who are seeking to hire women, Larsen advised: "Do not try to find a copy of yourself. To attract the best people, talk to people about why it is interest-



Agnès Grimont, Performance, Innovation and New Business Senior Vice President at Engie and the Chair of IGU's Human Resources Task Force.





Natural Gas driving growth and environmental protection forward



DEPA leads the way in Greece

DEPA is the company that introduced Natural Gas to Greece's Energy Market by developing the necessary infrastructure and networks. It's a group of companies, consisting of the transmission system operator and three distribution companies. DEPA has the 50% stake in the company, responsible for the construction and operation of the offshore gas pipeline connecting Greece with Italy and participates also in the company that will undertake the development and operation of the pipeline connecting Greece with Bulgaria.

DEPA works for the further expansion of the Natural Gas grid in Greece, so that more consumers can benefit from the environmental-friendly energy solution.



ing and what the gas industry can offer – act differently and spread the obligation as women to stay on and do the work."

Members of the panel told the conference about the reasons they are attracted to working in the gas industry. In particular, being involved in gas during an interesting transitional time for the global energy industry held strong appeal.

"Northern Europe is on the path to renewables and gas has a role to play – I am fascinated to be asked to be involved," said Larsen.

Reed said the growth potential and diverse customers are the biggest attractions for her: "With a lot of growth comes excitement."

"Gas has a strong role to play in the energy transition," said Lagumina, adding that innovations, such as the development of biomethane are impressive.

Other success factors for women

The issue of quotas for female recruitment was raised by multiple speakers as well as during the question-and-answer session.

In her introductory address, Nadeau mentioned the French policy of 40% female representation on the boards of publicly listed companies by January 2017: "There are philosophical doubts but, let's face it, it's worth trying at least at board level."

She compared the French example with the US where 5% of Fortune 500 CEOs are women, and 17% of board seats and 25% of management jobs are held by women.

"Diversity offers different strengths in leadership," said Nadeau. "Each board needs to analyse gender diversity."

Lagumina said company policy at GrDF is an "ambitious" target of one in three senior appointments being filled by women: "It's not 50% but it's a beginning."

A member of the audience asked how the representation of women in the gas industry can grow if less than 15% of applicants for many of the available jobs are women. Nadeau responded that it is important for management to prioritise training, education and role models for young women in their companies.

"There are a variety of programmes we need for this eco-system," said Nadeau.

The importance of networking was emphasised by Lagumina: "As a female CEO, it is interesting to be a woman when networking – women need to network more. Sometimes we don't want to take the time but we need to explain to young women the importance of networking."

Balancing work and family life came up for discussion during the question-and-answer session, with a particular focus on being a professional woman and a mother.

Reed said that US company policies vary on maternity leave and the work/life balance can be hard to prioritize, and that is an issue that transcends gender: "The reality is that at the soccer game, I'm on the phone about an energy issue but it's no different for women or men."

Lagumina agreed with Reed: "Young men have the same issue – they want to be successful executives who need to see their children."

Long maternity leave provisions on offer in northern European countries help women pursue their careers, added Larsen.

The panellists were asked what advice they would give to their 25-year-old selves and the responses were direct.

"Don't be afraid," said Larsen.

"You can do it," said Burmistrova.

"Be confident," said Li.

The panel agreed that young women need to be challenged rather than cosseted. The strategic panel session concluded with a call from all members to recognise the skills of young women, appoint women to leadership positions and give women tough assignments so they can demonstrate their capabilities.

Georgia Lewis is the Managing Editor of International Systems and Communications.



We are investing heavily in our future and it looks very bright indeed.

SOCAR, the State Oil Company of the Republic of Azerbaijan, is one of the world's largest companies in the energy industry. The company was founded in September 1992 on the basis of the industry structures operating during the former Soviet Union from the middle of the 20th century. The company's activities comprise the complete value chain from exploration of oil and gas fields, through production, processing, storage, transportation, to marketing and supply of oil and gas, petroleum and petrochemical products to domestic and international markets.

SOCAR has representative and trading offices in about 15 countries, including the United Kingdom, Switzerland, Singapore, Turkey and Germany.

Gas Industry

Proven natural gas reserves of Azerbaijan are estimated to be about 2.55 tcm. Annual production is about 29 bcm and it is expected to increase the export potential of Azerbaijan to a minimum of 40-50 bcm at 2025. Shah Deniz Stage 2 is a giant project that will add a further 16 bcm per year of gas production. Development of other Azerbaijan prospective structures Absheron, Umud, Nakhchivan, Babak and Shafaq-Asiman is planned in the near perspective.

The creation of productive economic synergies through expansion in international markets, implementation of investment plans and acquisition of new assets is the essential part of the strategic development of SOCAR.

Gas Markets & Strategy

Azerbaijan's gas strategy, based on the main principles of diversification, stability and security of supplies, has proved itself to be the right course in recent years. Currently Azeri gas is exported to Turkey, Russia, Georgia, and Greece. Azerbaijan supports Europe in achieving its strategic goal of securing further gas supplies and meeting growing energy needs. The Southern Gas Corridor will constitute one of the most complex gas value chains, offering substantial benefits for the range of countries from the Caspian Sea to the heart of Europe, consisting of multiple separate energy projects with a total investment of approximately \$45 billion.

Today, Azerbaijan's main objective is to have the Southern Corridor established and operating as soon as possible which will contribute to the country's gas export potential for further development. Large transportation projects in the frame of the Southern Corridor, such as TANAP and TAP are currently under the process of realisation, and SOCAR is heavily involved in this task. TANAP carries significant political and economic value due to its potential to transport not only natural gas from the Shah Deniz field to European end markets, but also from other Azeri fields and potentially from other producing countries. TAP, which will connect to TANAP on the Turkish-Greek border, will be delivering to, and interconnecting, multiple markets in Western and Central Europe.

Way to the Southern Gas Corridor After five years of negotiation with

European Union and transit countries a Final Investment Decision was signed on 17 December, 2013 that included the expansion of the South Caucasian Pipeline in Azerbaijan and Georgia, the construction of TANAP across Turkey as well as TAP passing through Greece and Albania and ending in Italy. Natural gas from the Shah Deniz field will constitute the initial source for this corridor which will significantly reshape Europe's energy map.

The groundbreaking ceremony for the Southern Gas Corridor was held in Baku on 20 September, 2014 and attended by the leaders of Azerbaijan, Bulgaria, Turkey, Greece and Georgia along with senior officials from the US, Italy, the UK, Croatia, Albania and other European countries who all put their signatures on the first piece of pipeline. Additionally, on 12 February, 2015, the Ministerial Meeting of the Southern Gas Corridor Advisory Council was held in Baku and at the conclusion all the participants signed a joint statement for the press.

SOCAR as a foreign investor

SOCAR has gained significant market share in various countries by relying on its internationally successful experience in foreign activities. SOCAR is the leading investor in Turkey and Georgia. The company's investment portfolio for Turkey will reach around \$20 billion through the implementation of TANAP, the development of the PETKIM Petrochemical Complex, the construction of the STAR refinery, a container terminal and a power plant. The STAR refinery project represents an investment of around \$5 billion.

Internationally, SOCAR holds 100 natural gas distribution stations in Georgia and 170 filling stations in Switzerland.

The company has successfully reached an agreement for the acquisition of a 66% stake in Greece's natural gas transmission system operator DESFA. SOCAR President Rovnag Abdullayev stated that the company's decision to buy into DESFA proves the high level of bilateral relations between Azerbaijan and Greece and their leading energy companies.

WWW.SOCAR.AZ

Challenges and Opportunities for Natural Gas in Transport

By Georgia Lewis

There was a strong focus at WGC 2015 on natural gas as a transportation fuel. IGU affiliated organisations NGV Global and NGVA Europe co-hosted a Natural Gas for Transportation Village in the exhibition, and many presentations outlined the benefits and challenges of making gas a more widely used transportation fuel.

A highlight of the Transportation Village was the arrival of the NGVs that took part in the 2015 Blue Corridor Rally. This rally commenced on May 24 from St Petersburg, Russia and travelled to Paris via Moscow, Minsk, Warsaw, Potsdam, Amsterdam and Brussels. After arriving in Paris on June 3, the vehicles were driven back to Russia. The rally took 21 days and covered 6,840km.

The Blue Corridor initiative promotes the development of an international network of CNG and LNG filling stations along major transportation routes. For Europe, the aim is to build 14 new filling stations and build up a fleet of 100 natural gas-fuelled trucks. The need for CNG and LNG infrastructure to promote the use of natural gas as an alternative fuel for transportation was a common conference theme.

Policy, environmental targets, market conditions and costs were cited as factors which could help or hinder the development of natural gas for transport.

Finding markets

Michael Stoppard, Chief Strategist, Global Gas, IHS Energy, spoke at "The Role of LNG as an Alternative Fuel" thematic session about developing a "sweet spot" in the market for natural gas in the transport sector. He proposed that the truck market is the sweet spot for LNG as a transport fuel.

While the lower oil price has squeezed the gas market in the short term, Stoppard des-



As IGU President Jérôme Ferrier (*left*) looks on, Alexander Medvedev, Deputy Chairman of Gazprom's Management Committee (*second left*) and Christopher Delbrück, CEO of E.ON Global Commodities (*third left*) welcome the Blue Corridor Rally to WGC 2015.



cribed the medium-term outlook for gas as a transport fuel as "positive". He cited a fall in the cost of natural gas-powered trucks and an expansion of retail infrastructure as two factors that will help grow this market.

Stoppard shared figures that forecast 13% of the global market for heavy trucks will be LNGfuelled with China and the US leading the way and the EU following. "From an environmental, economic and technical point of view, demand will increase," said Stoppard.

At the same session, Nick Allen, of Navigant Consulting, outlined the "seven golden rules for establishing LNG in the road transport sector". He explained that the rules were "seven behaviours" the gas industry should adopt to "develop a new end-to-end value chain".

The seven behaviours were to: be aware of market stimulants such as technology, legislation and industrial capability; convene all actors; promote collaboration between stakeholders; understand challenges; conceptualise the solution by promoting the overall LNG transport offer, with sub-offers such as leasing and refuelling, for a complete value chain; develop a commercial case for LNG confirming end-to-end value; and "conduct the orchestra" that is, sustain momentum to the end goal, address inter-player challenges and maintain confidence.

"Road transport solutions were stable for 100 years – just gasoline and diesel," said Allen. "Road transport is now in transition and it is not reversible – [it is time to] ensure LNG does not become a niche within a niche."

Bas van den Beemt, Business Development Manager – Offshore Production and LNG, TNO, discussed the market for small-scale LNG (SSLNG) for maritime and road transport. He cited a study for the European Economic Area which determined potential for global market volumes for SSLNG, concluding that maritime and road transport sectors offer more potential for SSLNG than power generation.

The need for ships to meet environmental targets in emission control areas such as the Baltic and North Seas could boost SSLNG in Europe. In the road transport sector, alternatives to gasoline, such as biofuels, electric and hybrid vehicles mean NGVs need to be affordable to compete.

Ease of distribution and bunkering makes SSLNG an attractive option and van der Beemt says that supplying multiple sectors will make the supply chain more cost-effective.



The Scandinavian countries are leaders in LNG bunkering – AGA's Seagas operates in the port of Stockholm.

Meeting environmental goals

At the Natural Gas Transportation Roundtable, Bernard Brousse, Head of Retail LNG, Engie, called for more investment in infrastructure to prepare the EU for environmentally friendly LNG-powered transport.

Brousse summarised the challenges for LNG in the EU, including the need for stabilised regulation, risk-taking on LNG infrastructure, sensible pricing policies for each market and maintaining safety. He said new truck and ship customers should invest in new vehicles and vessels rather than converting existing ones.

▼ Buses have been a successful sector for NGVs in the EU (BELOW) and the US (BOTTOM).

"I am very optimistic regarding this market even though it is difficult at the moment," Brousse said.





Ralf Grosshauser, Senior Vice President of MAN Diesel & Turbo SE, told the conference that "the whole picture needs to be attractive" referring to well-to-wheel emissions and the energy consumption footprint of LNG. He outlined some of MAN's innovations, including a 300hp concept truck and a dual-fuel two-stroke marine engine that uses natural gas and diesel.

Regional overviews – EU, South America, North America and China

Lennart Pilskog, Secretary General of NGVA Europe, highlighted the importance of transport when he spoke at the roundtable: "We all depend on transport for clothing, food, production. Everything has to do with transportation [but] 98% of transport trucks are fuelled by oil or diesel. We cannot depend on oil, we need alternative fuels."

Pilskog cited Italy as a success story with more than 70% of the EU's NGVs. Overall, he says buses have been a successful sector for NGVs in the EU with 22,000 units: "It's a good starting point."

Germany, Austria and Bulgaria have made great strides with NGV use. Additionally, Pilskog said LNG truck use is strong in Spain, the UK, the Netherlands, France and Belgium.

An EC directive on fuel infrastructure comes into effect in October 2015. The directive includes CNG infrastructure for all cities by 2020, CNG and LNG transport corridors by 2025, LNG inland ports established by 2030, common technical standards by 2016 and a plan to bring gas prices in line with petrol.

"Cooperation is the only way forward between all actors, politicians, stakeholders and fuel distributors to create a well-functioning market," said Pilskog.

Diego Goldin, Executive Director of NGV Global, painted a largely positive picture about NGV use in South America. Argentina and Brazil lead the way with 2.1 million and 1.7 million NGVs on the road respectively. In Colombia, the figure stands at 500,000, while Bolivia has

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322,500, Venezuela has 226,000 and Peru has 203,360. Lagging behind are Chile and Trinidad and Tobago with 15,000 and 3,500 NGVs on the road respectively.

Government support for NGV growth is strong across many countries, according to Goldin. Colombia has 716 filling stations and "government and regulatory support" and Bolivia, "a small country and tough geographically", has filling stations in every major city and a government program of converting cars to natural gas.

In Brazil, NGV growth is "currently unsteady" but with 1.7 million NGVs and 1,600 fuelling stations, infrastructure is strong. Peru is a newcomer to natural gas for transport but 203,360 cars have been converted to natural gas, it is a popular heavy vehicle fuel, and government support is strong. In Venezuela, Goldin said government policy is "aggressive" but the low price of gasoline remains a problem." However, he cited 1,000 CNG buses as a breakthrough.

Chile and Trinidad and Tobago, with the lowest numbers of NGVs, are taking different approaches. In Chile, with only 15,000 NGVs, Goldin said there is an "expensive certification process, not much government support and only 45 filling stations." However, in Trinidad and Tobago, an LNG exporter, there are plans to increase NGV numbers with a government program to convert taxis and buses to natural gas as an alternative to subsidised diesel.

Goldin said the natural gas transport sector will create new jobs, expand traditional industries and develop new niche markets and export opportunities across the continent. Environmental drivers for more NGV use include improved urban air quality and reduced soil and water contamination.

"Unfortunately, environmental drivers have been seen as the least important factor but big improvements are being seen," said Goldin.

Barriers include no overall regional policy and NGVs only refuellable in their country of origin.

Thus, NGVs are not taken across national borders and this affects the rental car market for tourists. Additionally, equipment for refuelling has to be certified in each country, there are gaps in refuelling infrastructure, and gas quality varies.

Goldin called for integration across borders, development of the LNG sector, and a common market: "Integration is needed but there is good public acceptance."

Charles Silio, Vice President, Strategy and Corporate Development, Agility Fuel Systems, gave the North American perspective. "The market was emissions-driven and now it is more economically driven," he said.

The market split across North America is 90% CNG vehicles and 10% LNG vehicles with the majority of NGVs used for heavy duty applications. Silio said the growth in NGV use since 2012 has been "dramatic", including fleet buyers with their own filling stations. Interest in natural gas as a fuel for marine, rail and mining operations was described by Silio as "significant but nascent".

Fuelling stations are on the increase across North America – there are 1,600 CNG stations of which around half are private, and 112 LNG fuelling stations, of which 74 are public and 38 are private. A further 63 LNG stations are planned.

North American trends include: an NGV market increasingly driven by fleet buyers, purchasing decisions based on total cost of ownership, and filling station developers diversifying by offering finance for NGVs.

The Chinese NGV market was reviewed by Phil Fathers, Business Director, Alternative Fuels, Emerson Process Management. The main drivers for China include greenhouse gas reduction targets, a target of at least 15% NGVs for public transport within 15 years, the high cost of importing oil and energy security goals.

Fathers said that LNG is largely used for buses and trucks, especially in coastal areas with a high population and extensive industry, as well as the western area and Inner Mongolia, as urbanization increases.

PHOTO BY MICHAEL POLIZA/NATIONAL GEOGRAPHIC CREATIVE

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 NGV fuelling stations are on the increase across North America. Currently, there are 3,000 LNG stations and 4,000 CNG stations for 300,000 LNG vehicles and 1.7 million CNG vehicles.

The popularity of the Beijing NGV trade show was cited by Fathers as an indicator of China's increased use of natural gas for transport, attracting 24,000 people in 2012 and 30,000 people in 2015. Fathers said joint ventures with western companies for technology are "at an all-time high".

Fathers said there is market volatility because of the low oil price but government support for NGVs is strong. Examples of this support include national regulations for CNG stations, draft regulations for LNG stations, and a national development committee to review all major projects, including all gas projects. While there have been delays in investment, Fathers said the market has "slowed but not stalled" and there is a "positive outlook in a two-tofive-year window".

Transportation Village

Presentations from exhibitors were given at the Transportation Village, including Daimler, Iveco, Renault and Volvo. Pierre Lahutte, Iveco's Brand President, outlined the company's performance as a "100% European producer". Since 2012, 380 LNG trucks have been sold, including an order from Ikea to facilitate furniture delivery to customers in Paris. Iveco has built 1,400 buses for Beijing and 5,000 buses for the EU.

To improve NGV use in the EU, Lahutte called for improved refuelling infrastructure, tax breaks and greater awareness of the safety of NGVs. He also flagged up biomethane from waste as a "virtuous" way to get more NGVs on European roads.

Manfred Schuckert, Head of Global Regulatory Strategy – Commercial Vehicles, Daimler, said the industry should present a "strict business case" for natural gas. Schuckert cited the US, with more flexible gas pricing and rising natural gas truck sales, as a positive example. With gas prices expected to fall, action to improve air quality across the globe, and market acceptance, Schuckert was upbeat about the future of natural gas for heavy vehicles.

"We need to show real reductions [in emissions and] biomethane and LNG can significantly reduce emissions from truck





 Manufacturers are improving the range of heavy-duty NGVs.

fleets." To this end, Daimler has developed a Euro VI-compliant truck with a natural gas powertrain.

Schuckert said that range issues, caused by limited NGV tank size, are easier to address in the US where there are only restrictions on trailer length, not the length of the whole truck, as is the case in the EU. He described the EU as a "very regulation-driven market" and called for a "European master plan" with standardized vehicles and refuelling stations.

Andreas Svenungsson, Senior Vice President – Public Affairs, Volvo, told the audience: "We want to save the planet and the balance sheet with economical, pioneer products and services."

For long distance vehicles, LNG and dimethyl ether (DME) are the company's "main prioritised alternatives" to diesel and gasoline. For medium distance vehicles, CNG, DME and electric charging are the main priorities, and for urban applications, Volvo favours electricity and CNG.

Svenungsson said France is an emerging market for NGVs. While the French government is calling for more electric vehicles, this is not always practical for trucks. He said gas is a "real alternative for trucks", with biomass or LNG. Locally produced biomass was cited by Svenungsson as an opportunity for job creation. He called for better refuelling infrastructure and a reduction in the price of gas in the EU to justify higher NGV purchase prices.

He concluded by saying that the industry has a "high demand for fuel quality" and that he endorsed NGVA Europe's call for standardization.

Karine Forien, Energy Efficiency Brand Strategy Director, Renault Trucks, discussed the alternative energy landscape for transport in the EU, called for better visibility for NGVs, more development of biogas and better refuelling infrastructure.

"Diesel dominates long-haul and will continue to do so for many years to come," she said.

Forien said that hybrid powertrains dominate the urban and interurban alternative fuel market, and for regional transport, biofuels and synthetic fuels are growing in importance.

"We need to propose the right transport solution at the right places with the right energy," she said.

Georgia Lewis is the Managing Editor of International Systems and Communications.

Angola LNG

Sonangol Gás Natural: Producing Energy for you.

A Vision and a Strategy looking into the Future.

Sonangol Gás Natural, also called Sonagás, was created on September 23, 2004 and it's one of Sonangol's latest affiliates, aspiring to be a major player within the natural gas industry.

With operations in different segments of the natural gas value chain – from exploration to commercialisation – Sonagás is seriously committed to providing a clean and reliable source of energy to support Angolan industrial growth.

Based on a strategic plan to develop natural gas resources, either on the Angolan offshore or onshore, Sonagás is leading different initiatives related to research and evaluation of natural gas fields that will ultimately lead to the development of these reserves, satisfying local demand and sales to international markets.

Our strategy encompasses the development of three natural gas regions, the Upper Congo Basin, the South Congo Basin and the Kwanza Basin, with the potential for high natural gas volumes to be developed. In order to allow the optimised development and economic viability of these gas regions, our goal is to develop a gas hub for each region under robust joint ventures created with partners/investors. These hubs will integrate projects within the entire natural gas value chain (from upstream to downstream).

With the development of these projects our vision is to be recognised internationally as an integrated, selfsufficient and cost-effective business, operationally reliable from research to commercialisation. We add value to the country, our employees and partners, by offering a range of quality products and services, promoting new business opportunities and inducing integrated investments along the entire natural gas value chain.

In the midstream segment, the Angola LNG project is an important part of Sonangol's strategy to develop the natural gas industry in Angola. The main objectives are to produce and commercialise LNG, motorise the country's natural gas resources and contribute to the protection of the environment through the reduction of associated gas flaring. The project, a partnership between the major oil companies operating in Angola, is estimated to be fully operational during 2016 with a capacity to produce 5.2 million tonnes (7.1 bcm) of LNG per year.

As part of its current activities in the downstream segment, Sonagás owns and operates 13 LPG bottling facilities, which are responsible for sustaining Sonagás' 63% market share nationwide. As part of its investment and modernisation plan, Sonagás is in the process of constructing high capacity new facilities, which will allow the satisfaction of market needs and increasing consumption trends.





Sonangol Gás Natural





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Post-Conference Reports from the Committees and Task Forces

Working Committee 1 – Exploration and Production

For the 2012-2015 Triennium WOC 1 selected three topics and set up three study groups accordingly:

- Technological advances in gas exploration and production;
- 2 Assessment of global reserves and resources;
- **3** Gas rent and mineral property rights. The first study was motivated by the fact that the production of natural gas has become significantly more expensive over the last few years, not only because new reserves are more difficult to develop than before, but also because the cost of the services and products consumed by the industry has increased substantially. Thanks to the development of new technologies, however, productivity has also improved significantly, and because of that gas

continues to be one of the most abundant and affordable fuels in the world.

The second study group carried out an assessment of conventional and unconventional gas reserves and resources. Some of the most important projects under development were described, and their potential impact on the availability of natural gas from both regional and global standpoints was inferred. Exploratory hotspots and new frontiers were highlighted, and the most important trends, opportunities, uncertainties and threats to be faced by the upstream segment of the gas industry were described and analyzed.

The third study group compared some of the most important models in use to balance the interest of upstream investors and governments. Looking to maximize their revenues, governmental regulators

The sessions WOC 1 organized for WGC 2015 included a strategic panel on gas flaring and venting reduction.





must create and maintain an attractive atmosphere for business which will develop a winwin situation for themselves and upstream investors. Concessions, sharing, buy-back and transfer of rights contracts were analyzed, together with the large arsenal of fiscal instruments used by regulators and policy makers, including signature bonuses, royalties and taxes on profits.

A number of best practices were described as a means to help the industry, policy makers and regulators in securing a reliable and affordable supply of natural gas to consumers. The three studies constitute the three parts of the report published by WOC 1 for WGC 2015.

Working Committee 2 – Storage

Underground Gas Storage (UGS) represents unique assets of the gas value chain combining geological reservoirs with subsurface and surface infrastructure. Storage provides general benefits to the entire gas infrastructure in order to help the final customers to get their gas in an efficient, reliable and secure way. For the 2012-2015 Triennium WOC 2 had three study groups:

Study Group 2.1 Underground Gas Storage Database

This group has been working for five triennia providing a valuable summary of UGS activities worldwide. Total working gas volume (WGV) is 393 bcm without taking into account long-term strategic reserves, operated in about 715 storage facilities all over the world with a withdrawal rate of some 6656 mcm/d. Most storages have been developed in former gas fields.

During the 2012-2015 Triennium a special web-based application was developed summarizing study group's deliverables as follows: UGS data viewer; UGS facts in charts and tables; UGS interactive map; UGS vocabulary in 14 languages; and studies from previous triennia. This is accessible at http://ugs.igu.org/ after registration. A general definition of trends in established and emerging gas regions is provided.

Study Group 2.2 Techniques and New Opportunities

The main focus was on UGS techniques, new opportunities and best practices. Operators of UGS facilities have to react quickly to changing market demands for gas while raising safety

 There were 39
Interactive Showcase sessions during
WGC 2015.



▲ WOC 2's sessions included one on general trends and perspectives for UGS. standards and reducing environmental impacts. The first part of the study looked at subsurface integrity management and the second at the reduction of the environmental footprint of UGS operations and the enhancement of their energy efficiency.

Furthermore, information on the extent to which UGS technology may contribute to energy storage generated from intermittent renewable energy sources was given. This focused on the identification of solutions UGS applications might contribute, on the related technology gaps together with the R&D effort needed to overcome them, and on current market uncertainties, opportunities and constraints likely to impact the deployment of these UGS.

More about these topics were published in the IGU magazine in the April-September 2014 issue (see pages 176-180) and the October 2014-March 2015 issue (see pages 166-174).

Study Group 2.3 Human Resources – Attracting Students to Work in Gas Storage

The main goal of this study group was to find the key factors affecting talent attraction to the UGS sector and to develop strategic approaches to HR development. The results were based on a questionnaire and were documented in a comprehensive report.

The study group also organized a competition to mark the 100th anniversary of UGS. The competition was aimed at students and young specialists working with or willing to work in the UGS industry. Authors of the four best entries won free participation in WGC 2015.

Working Committee 3 – Transmission

The pipeline industry has to cope with the challenge of linking supply with consumption so gas transportation systems have to ensure that:

- They support the emergence of new supplies and trade routes;
- Existing lines run at full capacity with high reliability, safe operation and projects to extend their remaining life. Integrity management systems play an important role here;
- New, larger and more efficient compressor plants are constructed;
- New materials, new technology, new regulations support these changes;
- New regulations and best practices to mitigate risk are implemented.



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For the 2012-2015 Triennium WOC 3 set up three study groups:

- 1 New Transmission Projects;
- 2 Pipeline Integrity Management Systems (PIMS);
- Public Acceptance and New Technologies Applied to Transmission Systems. The study groups issued three reports and their main conclusions are:
- The time of big new-build pipelines in Europe is over; there is a potential for development in Russia, Middle East and Asia;
- Technical challenges can be solved; it is a question of money and intelligence;
- The chance to re-use existing natural gas pipelines for CO₂ transmission does not appear to be an option because the minimum operating pressure for a dense phase CO₂ transmission (7.4-8 MPa) falls within the range of maximum operating pressure of the gas onshore networks (usually 8 MPa);
- Considering the intermittency of renewable sources, it seems reasonable to assume variable delivery rates of CO₂ in separation plants since the fossil fuel based power plants will have to provide necessary swing capacity;
- The transmission gas infrastructure is often considered as acceptable and less polluting, but acceptance by the public grows more complex each day and the image of the gas industry could be affected by a bad experience or a serious accident;
- To suppress or reduce as much as possible the adverse impacts of gas infrastructures on the environment through adopting the best practices;
- Providing an overview of new technologies and their application in transmission systems in relation to safety and reliability and environmental footprint reduction;
- A solid PIMS must rely on a strong database in order to assess all the technical issues with which a transmission operator is involved. Most companies already follow this principle and the remaining ones are on their way to doing so;

- Third party interference and external corrosion have been identified as the major threats to pipelines;
- To avoid third party damage, pipe construction should be carried out in the safest way (design factor, coating, pipe depth, safety distances and restrictive area, cathodic protection, pipe markers, major protection crossing rivers, roads, rails, etc.);
- The prevention of third party damage is not entirely the responsibility of TSOs. Stakeholders, real estate owners and local governments should also get involved;
- There is neither a typical life time nor an economical life time for a pipeline; this varies from one company to another;
- The use of decision tools (including capex and opex) as a way to decide on pipeline defects is still not common. Companies which are not using tools make decisions based upon their own experience and according to the way they operate and maintain pipelines. Of the companies using tools 60% rely on technical decision tools and 40% on mixed technical-financial tools.

Working Committee 4 – Distribution

For the 2012-2015 Triennium WOC 4 set up three study groups.

Study Group 4.1 Regulation of Third Party Access (TPA) to Gas Distribution Networks – A Standard Approach

TPA is usually connected with gas market liberalization that includes concepts such as open access and unbundling regimes. TPA is conceptually motivated to obtain benefits such as creating competitive gas markets, reducing prices, securing supply and improving services to the customers, among others.

The results of the study group's analysis showed that TPA presents a wide variety of concepts and stages of development worldwide. The level of implementation seems to be directly related to the maturity of the gas industry in



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▲ A good audience for WOC 4's session on smart gas grids. the area studied. The USA/Canada and EU adopted different approaches to TPA regulations, but were successful in implementing an effective TPA model. The reason for this success relies on the regulatory framework adopted and on market conditions. Being two of the major and most mature markets in the world, the conditions for the implementation of TPA were favourable because of the large number of supply sources, the highly interconnected systems and their saturated market territories. The main conclusions of study group 4.1 are:

- The motivation behind TPA is to create competition, reduce prices, secure supply and provide better services;
- TPA is important under certain conditions to create a market;
- Every country needs individual rules for the implementation of TPA, which are highly dependent on the maturity of the market and political conditions;
- TPA does not work if there is one company in the market or a unique state-owned company. The legislation itself cannot guarantee a free market.

Study Group 4.2 Evolution into a Lower Carbon Gas Future: Managing the Diversification of Gas Quality

For decades the source of natural gas supplies to any given location remained stable. Generally, distribution grids comprised of one or possibly two sources of supply based on longterm delivery contracts. In many parts of the world, this is no longer the case and there is growing diversification of supply – LNG instead of pipeline gas, local fields or non-conventional sources – and hence gas quality.

The central question is: Why should the gas industry promote new technologies and new gases?

The study group's work showed that there is a long way to go to achieve a master plan for a global strategy into a lower-carbon gas future and to achieve the Kyoto targets in 2050. The research on gas infrastructures including acceptable gas quality compositions, possible technological and regulatory measures and timelines provided a good basis for the development of a master plan for the future. The "evolution into a lower-carbon gas future" will be characterized as a "green gas evolution" instead of a "revolution".

Study Group 4.3 Smart Grids in Gas Distribution

Network operators are providing gas distribution services. In the future, the energy landscape will change with sustainability and energy efficiency becoming increasingly important. The current and traditional gas grids are demanddriven and operated in a passive way. In the future they will be operated under variable conditions, becoming active networks including interactive functionalities pushed by technological innovations that are currently bringing cheap, reliable and efficient solutions with new sensors, remote control devices and real-time simulation of gas flows.

A smart gas network can be defined as a gas grid that is fully remote controlled and, in its ultimate form, operates and adjusts automatically to fulfil a set of needs connected with customers' expectations and network performance. The study group's report presents some key points about this new concept, including an analysis of the possible uses of the smart grid



concept in the future of gas distribution, of the impact on the design and operation of distribution systems and of the needs in new technolgies. The different technical difficulties and costs that can appear for distribution network operators are also pinpointed.

Working Committee 5 – Utilization

It has always been understood by WOC 5 members that end-users are the focal point of all efforts and resources committed by the gas industry. The ultimate goal is to help meet the needs of the final customers for clean, abundant and affordable energy.

The objective of the committee during the triennium was to monitor the following issues related to utilization of gas:

- Reviewing political and economic mechanisms in the natural gas market at the enduser segment;
- Expanding accessibility of methane through new and unconventional technologies: LNG, biogas, E-gas and others;
- Further development of regulations, norms, standards and codes of practice. One challenge is to make implementation of those regulations less expensive and more convenient with no compromise to safety;
- Propounding knowledge, both fundamental and applied; expanding public awareness;

improving training and education of gas personnel and private citizens;

- Encouraging investment to improve economics in the gas utilization segment;
- Developing promising new technologies, advanced equipment, techniques;
- Building up safety throughout the technical chain;
- An overview of what was learnt throughout the triennium.

The following areas and fields have been discussed during the triennium:

- Audits for customers and proposals of energy efficiency solutions using gas;
- Blue corridor NGV rally;
- Combination of gas and renewables;
- Fuel switching from liquids or e-power to gas;
- Gas-driven heat pumps;
- Gas quality;
- Heat and power generation (co-generation, micro-CHP), climate control by gas-fueled systems in the residential, small commercial and industrial environment;
- Hybrid technologies: EHP-condensing; fuel cell boilers etc.;
- Hydrogen: wind/solar power to hydrogen (electrolysis) and to methane;
- LNG bunkering for maritime and inland waters;

✓ The panel for WOC 5's natural gas transportation roundtable with WOC 5's Chair, Eugene Pronin third from the right.



- New technologies on the horizon;
- Small-scale LNG for all kinds of end-users;
- Upgrading of biogas.

Each study group and topic team prepared and presented their final report during thematic sessions. These reports contained specific information about topics listed above. Additional information could found in oral and interactive presentations made at WGC 2015.

Program Committee A – Sustainability

PGC A focused on the environmental effects of natural gas. Although natural gas is the cleanest of the fossil fuels, it still contributes to global warming by emitting greenhouse gases. It is crucial that the gas industry understands the true impact of natural gas on the global environment so it can be more than transitional or bridge energy.

During the 2012-2015 Triennium, PGC A focused on four topics: carbon capture and storage (CCS), biogas, life cycle analysis (LCA) and unconventional gas.

CCS technology coupled with natural gas is a promising technology to cope with global warming. Although it is not an ultimate solution, it buys precious time as the world unites to cope with one of the greatest challenges of our time. The committee published a report outlining how CCS can be introduced to the gas industry and made useful recommendations.

Biogas is a carbon-neutral type of natural gas. It is not available everywhere because the feedstock is either unavailable or insufficient. But it could play a valuable role in remote areas where energy infrastructure is not in place. The committee produced a biogas country report on how the gas is produced and to what extent.

The LCA of natural gas, which describes its comprehensive environmental effects, will help understand how the industry could do more to reduce greenhouse gases along the natural gas chain. The committee's study showed that the industry is aware of the LCA and its usefulness, but due to the lack of basic information the industry is still in the process of introducing this tool.

With the advancement of production technology, unconventional gas, such as shale gas, has become a focus of global attention. The committee studied the environmental effects of this new natural gas resource to find out what the truth is and what the industry can do to reduce its environmental impact.

Right now natural gas is a competitive, promising source of energy, and it will continue to be well into the future. However, to make this possible, the industry must continue to work hard and communicate with stakeholders along the way.

Program Committee B – Strategy

During the 2012-2015 Triennium, PGC B focused on three topics for study:

- 1 World gas supply, demand and trade;
- 2 Wholesale gas price formation;
- **3** Strategy and regulation.

The committee also carried out a study on the long-term prospects for natural gas; identifying the main drivers that will determine the future market for gas.

The world gas supply and demand study highlighted a continued growth for natural gas in the world. Global demand, which is currently at 3300 bcm per year, is expected to grow with a compound annual growth rate of 1.1 % per year, which means that by 2035 global demand will have reached 4800 bcm. However, growth has started to shift from the established gas industries in Europe, North America and the CIS to growing markets in Asia, in particular China and India. Considerable growth is also expected in the Middle East, which has seen continuous growth in recent years, adding almost 200 bcm in demand within the last 10 years.

The wholesale gas price formation study was the seventh in a row and covered almost all gas demand in the world. It was found that 43% of gas traded is priced based on some form of gason-gas competition, with 35% of global gas



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▲ IGU Wise Person Nobuo Tanaka addresses PGC B's strategic panel on the 2050 prospective study.

consumption determined by regulation and 17% linked to oil. In Europe, gas-on-gas competition has increased from about 15% in 2005 to 60% in 2015. Additionally the percentage of global gas sold at regulated prices below cost, a form of state subsidy to the population, has decreased from about 10% in 2005 to 5% in 2015. With the rapid growth of LNG, the percentage of oil-linked prices has increased in Asia-Pacific. The full report *Wholesale Gas Price Survey – 2015 Edition* is also available on the IGU website.

The study group on strategy and regulation concentrated on finding the best practices on this complex topic. It was evident that the gas industry is confronted with a wide range of strategic and regulatory principles. The study consisted of four parts:

- 1 A questionnaire was developed to identify business cases on strategy and regulation and with the long-term objective of finding some structure. The questionnaire has not yet led to concrete results, but will be a stepping stone for research on this topic in the next triennium.
- 2 Investment challenges facing the gas industry were explored. The work showed the relationship between the challenges for the (European) gas industry and the catalysts needed for this (stability, incentives, advocacy and targeted investments).
- 3 The cooperation between IOCs and NOCs was investigated. Five projects were studied and four key factors for cooperation were found: trust, government support, finance and the added value of the IOC in this.
- 4 The final part of the study was a survey conducted to investigate energy poverty. The results showed the different approaches, definitions and the appreciation of the topic, and that there is growing concern about energy poverty.

The study group has built up contacts with the International Confederation of Energy Regulators (ICER); both parties have agreed that they will cooperate in the next triennium. Since 2009 IGU has presented in each triennium a long-term outlook as part of its advocacy efforts. For the 2012-2015 Triennium, PGC B was assigned with this task resulting in the report "Prospects for Natural Gas: Identifying the key developments that will shape the gas market in 2050". This highlighted two factors:

- Technical and market developments: The development of LNG and unconventional gas, the role of natural gas in combination with renewables and the development of gas for transport;
- 2 Policy developments: Energy security, environmental policies and climate policies. In conclusion the prospects for natural gas are good, but are not self-evident. Consequently, the gas industry must be constantly engaged in active and transparent communication about the role gas can play for the economy, the environment and in a long-term strategy towards decarbonization.

Program Committee C – Gas Markets

The basic mission of PGC C for the triennium was to identify and analyze the emerging issues and key market drivers that both developed and developing gas markets are facing and to provide insights into the promotion of these gas markets. For this reason, PGC C focused its attention on specific worldwide issues and their impact on the regional gas markets.

The two most important issues selected by committee members were the "Role of Natural Gas in the Electricity Generation Mix" and "Implications of Developing Unconventional Gas". The former theme was studied by Study Group C.1, led by Alexey Biteryakov of Gazprom, Russia and the latter theme was examined by Study Group C.2, led by Shigeki Sakamoto from IAE, Japan.

Extensive studies on the two subjects were carried out by the study groups. SG C.1's report attempted to forecast the future of natural gas in the European electricity generation mix,



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Teamwork



PGC C organized a strategic panel on gas development in emerging economies jointly with TF 3.

 PGC D's Chair, Dirk van Slooten listens to a point made by Marcel Kramer, IGU's Regional Coordinator for the Russia-Black Sea-Caspian area. giving special attention to the possibility of Europe being a model for other markets. In the process of analysis, it reviewed other power markets such as Japan, Korea and the MENA region and drew various conclusions.

SG C.2's report started its analysis on US shale gas and then extended it to other countries developing unconventional gas including Australia, China, India and Indonesia. The report also investigated the potential of shale gas development in Europe. At the end of the report, analysis of the challenging issues in developing unconventional gas was provided,



with special attention paid to the Asia-Pacific LNG market.

A total of 58 committee members from 23 counties took part in and contributed to PGC C's activities. During the triennium, two joint committee meetings with PGC A in 2012 and 2013 and a tripartite meeting with WOC 1 and PGC A in 2013 were held during which committee members were able to exchange information and share knowledge. In addition, a workshop organized as part of every committee meeting provided a platform for committee members and invited outside speakers to exchange views and network with professionals from all over the world.

Program Committee D – LNG

During the 2012-2015 Triennium PGC D held six meetings with the venues evenly spread over the various continents. Around 102 people participated in the different meetings and the workforce was divided into four study groups, each delivering a report at the end of the triennium in time for WGC 2015. There was also an interactive presentation of their results.

Study Group D.1 Remote LNG

Objective: Do new developments at higher latitudes (Arctic) and in remote areas (Africa or smaller communities) bring new challenges for



LNG and need different approaches than in the past?

Deliverable: A very readable report resulting in a "Remoteness Index" indicating the degree of complexities to be dealt with.

Study Group D.2 Small-Scale LNG

Objective: Create an overview of options, opportunities and challenges for small-scale LNG terminals.

Deliverable: An overview of potential regions and countries of interest as well as tailor-made technical requirements/solutions, business models and economic hurdles. This report is closely related to the LNG as Fuel report.

Study Group D.3 LNG as Fuel

Objective: Create an overview of potential "new" markets for LNG and technical challenges in land transport fuels and shipping bunkers. *Deliverable:* A two-fold report on land transport fuels and vessel bunkering.

Study Group D.4 Life Cycle Analysis

Objective: Comparison between hydrocarbon fuels (diesel and gasoline) and natural gas/LNG over the whole cycle of LNG from liquefaction to regasification.

Deliverable: A staged report with a specific ISObased modular identification system to indicate the specific contributions of each "module" in the LNG value chain to environmental impact – a solid basis for further development of LCA studies.

World Annual LNG Report

In this triennium the World LNG report has grown from an upstream-driven report to a global report supported by upstream, midstream, shipping (SIGTTO) and regas terminals (GIIGNL) organizations. It has become a reference document for many organizations and governments such as IEA, NGOs, IOCs and NOCs. The 2015 report includes a summary of the work done by the four working groups in LNG.

Program Committee E – Marketing and Communication

For the 2012-2015 Triennium PGC E had a two-fold objective:

- To identify and develop ideas, tools and products for a successful promotion and sale of natural gas.
- 2 To define ways to convey effectively the merits of natural gas and its role in sustainable development, and in a clean economy. The committee was structured in three study groups.

Study Group E.1 Additional Uses for Gas, How do we go Beyond Gas to Power?

At WGC 2015 SG E.1 presented best practices on how individual companies/industries and countries have promoted alternative uses of gas successfully; the focus of the analysis was on how the gas market expands.

Study Group E.2 Effective Gas Marketing and Lessons from Other Industries

This study group developed a benchmark of what other industries have done to communicate their message more effectively than the gas industry, and during WGC 2015 presented different examples of effective marketing campaigns.

Study Group E.3 Public Acceptance of Natural Gas Projects

This study group promoted debates at different events during the triennium and at WGC 2015 presented a model for public acceptance and lessons learned from case studies in Australia, France, Ireland, Poland, South Africa, Spain, The Netherlands and the USA. The study group also supported the IGU Secretariat in its ambition to become a more active voice in the global gas debate. The study group acted as a soundboard for the development of a new global gas portal and IGU advocacy and communications strategy.

Program Committee F – R&D and Innovation

Development and implementation of advanced technology has contributed to a robust global supply portfolio, particularly through the development and promise of unconventional gas supplies from shale and coal-bed methane resources. The security and price implications from expanded supply have impacted downstream technology such as infrastructure development and gas utilization opportunity. Each of the value-chain segments of the gas industry is driven and impacted through the application of technology and innovation.

The efforts of PGC F were focused on advancing technology innovation and collaboration impacting the spectrum of the natural gas industry – from exploration and production through utilization. The committee tasks and activities were focused on the organization of an international research conference as well as highlighting notable technology that impact industry growth, safety and operational efficiency. PGC F had a total of 51 members and progressed under three study groups:

Study Group F.1 Technical Program for the IGU Research Conference (IGRC2014)

SG F.1 prepared the technical program for IGRC2014 which was held in Copenhagen, Denmark, September 17-19, 2014. Attendance exceeded 750 participants from 46 countries and offered an informative and engaging event for all participants.

Study Group F.2 Development of International Gas R&D Collaborative Programs

SG F.2 focused on developing a framework for broader international collaboration in gas research and innovation.

Study Group F.3 Convergence of Gas with Electricity and Renewable Energy

Worked to identify and characterize new business models that anchor natural gas as part



✓ PGC F's sessions included one on the convergence of gas appliances and infrastructure with electricity systems and renewable energy.



of the future energy mix. This activity was the focus of a thematic session at WGC 2015.

What was learnt throughout the triennium?

Although there is recognition of the value and impact of technology on the gas industry, the value must be communicated more broadly to sustain required technology investment. Specific learnings included:

- Technology innovations have delivered tremendous social, industry and consumer benefits;
- Shale gas and other unconventional resources have had a clear game-changing impact;
- Continued technological evolution on reducing the environmental footprint for shale drilling, completion and production operations is needed;
- Seamless integration of biogas and greenenergy options is needed for a sustainable gas industry;
- There is increased movement towards an integrated "smart energy grid" that encompasses the best of natural gas, renewable energy and electricity distribution;
- Improved methods and approaches to safely and efficiently manage existing pipeline and delivery assets are needed;
- The introduction and growth of small-scale LNG will help monetize stranded resources;
- Gas is growing in importance as a transportation fuel – both CNG and LNG vehicles and infrastructure.

Task Force 1 – Human Capital

The fourth pillar of the 2012-2015 Triennial Work Program was dedicated to human resources, to address the fact that the gas industry will face a talent crunch in science, technology, engineering and mathematics (STEM) subjects in most parts of the world. TF 1 gathered 50 members from 31 countries. All the regions were represented (Africa, Americas, Asia, Europe and Oceania).

TF 1 addressed two main topics: how to attract women and talent and how to retain

women and talent. The work was organized into four main tasks:

The elaboration of the final report entitled "Delivering on Talent". The report is based on a questionnaire with 76 answers and 75 dedicated interviews. It provides recommendations regarding young professionals and women.

The organization of a workshop with UNESCO on Women in Engineering in Africa and the Arab States in December 2013. The event welcomed high-level speakers from Africa and the Arab states who explained how they managed their career paths and overcame barriers. A special report was published. IGU is maintaining the relationship with UNESCO.

The preparation of two strategic panels, one thematic session and one interactive showcase session for WGC 2015. Some 13 papers were presented in Paris which gave a broad overview of HR practices within the gas industry worldwide.

The organization of the WGC Youth Event which gathered 150 young people from all over the world, for three days of intense networking and creativity.

Task Force 2 – Gas Advocacy

At the beginning of the triennium the energy sector was starting to face increasing challenges that led to structural changes in the natural gas market. The mitigation of climate change became one of the most important political issues, along with security of supply and access to energy at reasonable prices. In this framework, the original mandate of TF 2 was to demonstrate and endorse the essential role of natural gas in the transformation of energy systems. TF 2 was the first task force to become involved in global gas advocacy and there was no model for the relationship between this kind of initiative and the existing advocacy programmes followed by individual members of IGU. This factor was taken into consideration during the definition of the position papers that TF 2 developed during the triennium.



▲ TF 1's Chair, Agnès Grimont.



▲ TF 2's Chair, Michele Pizzolato.



▲ IGU Wise Person Professor Coby van der Linde addresses TF 3's session on geopolitics and energy security.

In line with its mandate, TF 2 released the following documents during the 2012-2015 Triennium:

- "How Natural Gas can Contribute to the Electricity Security of Supply: The capacity payment mechanism" – A position paper and an article for the IGU magazine (see pages 158-162, April-September 2014) supporting gas-fired generating plants in the case where markets do not recognize the value of flexible power generation capacity.
- "Shale Gas: The facts about the environmental concerns" – A side letter to present the report prepared by IGU for the 26th World Gas Conference to a list of selected institutional stakeholders.
- "The Competitive Relationship between Coal and Natural Gas" – A position paper on the policy actions that could establish equilibrium between natural gas and coal, taking into account the environmental aspects with reference to all the pollutants.
- "Natural Gas in the Transport Sector" A short advocacy paper (to support the dedicated study group of WOC 5) outlined a couple of points that covered the tri/quadrilemma of the sector.

Throughout the triennium, the lesson learned by TF 2 is that in IGU, where the technical committees have a consolidated "tradition", for the task forces (which change their role and targets every triennium) it is difficult to work in continuity. Their effectiveness is strongly influenced by the commitment of the members that are part of the group. With particular reference to Gas Advocacy, the constraints faced by TF 2 in the 2012-2015 Triennium are going to continue in the 2015-2018 Triennium. The efforts made during the French Presidency to develop communication initiatives are going to produce results. The Global Gas Portal is already a reality and the choice to move further to the next level of Gas Advocacy, integrating this activity under the responsibility of the Coordination Committee,

is certain to improve the quality of the IGU lobbying initiatives.

Task Force 3 – Geopolitics

During WGC 2012 in Kuala Lumpur, this task force issued a comprehensive report on the geopolitics of natural gas focusing on the interaction of industry, states and international organizations (governing bodies) and how this impacts gas trade flows and the development of the gas sector. During the 2012-2015 Triennium, TF 3 extended this focus to other actors/stakeholders – non-governmental organizations, interest groups, civil society etc. – and how they impact policy on natural gas and our business environment: the so called New Dimensions.

The main report on the New Dimensions first revisits the geographical areas of interest as identified in the 2012 report and briefly discusses the developments observed in these regions. It continues to investigate the role of various stakeholders that increasingly have an impact on the industry. For the purpose of the study TF 3 prepared several roundtable meetings to address the regional issues and to understand which actors had an impact there. These sessions resulted in a series of papers which were published together with the main report.

Additionally TF 3 produced two publications with a more in-depth investigation into the impact of stakeholders on issues with great (geo)political impact:

"How Green is Natural Gas?" A study that looked at how the role of natural gas is perceived by the public and how IGU could address some of the concerns;

Local content strategies, where key factors of success in maximizing the benefits to host communities were identified, hence strengthening the industry's (social) license to operate.

Finally TF 3 published a paper "The Law of the Sea", focusing on how states can overcome maritime border conflicts that hamper the development of oil and gas resources in many areas with great potential.



WGC 2015 Digital Tools

During WGC 2015 three types of technology were used to improve the way delegates interacted with each other and to enhance participation in the conference sessions.

Mobile App

The WGC 2015 mobile application detailed the full conference program and provided details about the venue and exhibition. Links to the other digital tools at the conference were also provided.

- In total 1,753 people used the native apps (iOS and Android) and a further 4,307 the web app.
- The most popular page on the mobile app was the list of delegates with more than 58,000 views.
- Around 395,000 pages were viewed in total by all users.
- An average of 65 pages were viewed per user.
- The countries of origin of delegates who used the app the most throughout WGC 2015 were:
 - USA representing 30% of traffic;
 - France representing 15%;
 - UK representing 10%.



Wisembly

New for WGC 2015, this digital interactive app enabled participants in each session to interact live during the session. Participants could ask questions and share opinions using their mobile phone, laptop or tablet to take part in the debate or the topics discussed, without interrupting the presentation.

Most of the conference session rooms were equipped to enable Wisembly to be used. More than 50% of delegates were connected and used Wisembly, and 90% of them felt it made conference sessions more alive and attractive.

Wisembly was beneficial in:

- Enabling participants to send accurate questions to the session leader;
- Enabling the leaders of the session to gauge which issues interested the audience most;
- Adapting the session for the participants;
- Maintaining a lively and interactive session.

Poken

Also new for WGC 2015, the Poken device allowed the sharing of personal data between delegates who



Delegates touching a media wall to obtain information on their Pokens.

could collect conference materials via the onsite media walls and access the conference proceedings via the Poken cloud-based portal.

Throughout and since the conference, Poken with its online cloudbased portal has proved to be incredibly popular:

- In total 2,930 Poken devices were distributed;
- Nearly 10,000 touches took place between delegates to exchange details;
- 82,000 touches took place to collect information from the media walls;
- 3,500 accounts were created.



Fueling the Future

Around the world, natural gas has tremendous potential for growth. The USA triennium is leading the International Gas Union and helping strengthen the global voice of gas to leverage the vast opportunities that exist and support market expansion across the globe.







Markets



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The New IGU Triennium

The USA joined IGU in 1932 and has held the Presidency for two previous triennia – 1952-1955 and 1985-1988. Now the USA is taking the helm again. In this special section, the Chair of the Coordination Committee and Senior Advisor to the USA Presidency outline the work programme for the 2015-2018 Triennium which will culminate in the 27th World Gas Conference in Washington D.C.

IGU

The USA Presidency Gears Up to Lead the IGU Triennium and Tackle the Complex Challenges Facing the Global Gas Industry

By Mel Ydreos and Terry Thorn



Mel Ydreos,
Coordination
Committee Chair.



 Terry Thorn,
Senior Advisor to the USA Presidency.



 Anette Sørum Nordal, Coordination Committee Secretary.

On June 5, 2015 the Presidency of the International Gas Union passed from France to the USA with Jérôme Ferrrier handing over as IGU President to David Carroll. That same day, we presented the 2015-2018 Triennial Work Program (TWP), the USA Presidency having established the theme for the triennium as "Fueling the Future". As we noted, the next three years of IGU's long and distinguished history will take place during a time of great uncertainty as the world debates the future of global energy systems. The following article highlights the background to the TWP and gives an overview of the work plan for each committee and task force.

Do you ever wonder what keeps gas industry executives up at night? There are the endless

aspects of the international energy economy to think about: economic and financial risk, market growth and expansion, regulations, brand and reputation, the need for innovation, customer and key stakeholder relationships, human capital retention and development, operational excellence. And in 2015, oil prices, which seem to affect every industry, are on everyone's minds.

Looking ahead, the list of risks, opportunities and challenges and potential for optimism and concern seem endless.

The emergence of new supply sources has expanded the world's base of economic natural gas supplies. The North American shale boom has led the way and provided the tools and techniques to other countries with significant shale reserves such as Argentina and China.





There are also significant challenges associated with natural gas development. These include minimizing the impact of development on the environment and communities and the construction of pipelines, compressor stations and distribution facilities to move these supplies to markets.

The demand mix continues to evolve as the economic slowdown and improvements in energy efficiency have impacted total energy demand. Increased production from shale plays has lowered natural gas prices, the Fukushima Daiichi nuclear accident in Japan has created skepticism about nuclear energy, and Europe, Asia and North America have experienced exponential growth in renewable energy.

Still there exists great promise for natural gas demand growth in existing markets such as China, India and Brazil and in emerging markets across Africa, the Middle East and in the ASEAN region. These new markets include an expanded use of natural gas as a transportation fuel. Entering these markets will require new business models and an understanding of the regional economic, social and technological challenges and how they affect the business environment. The liquefied natural gas (LNG) industry is venturing into new territory as it approaches an unprecedented wave of expansion. While there are technical challenges, more important are the non-technical challenges, including budget and project overruns, a limited pool of skilled labor, high capital costs, competition from other projects and pricing.

The expanded development and use of natural gas is compatible with the goal of a cleaner, lower-carbon environment. The gas industry will need to redouble its efforts to show through word and deed that its operations are environmentally responsible and that using more natural gas is compatible with growth in renewable energies. It will require educating the public on our product and the safety of our assets. It will also involve managing the environmental impacts associated with the production, transportation and distribution of natural gas. The industry will have to understand the political and legal structures that encourage environmental sustainability, promote energy efficiency, encourage greater use of clean fuels and allow energy access, and the subsidies and fiscal policies that promote one form of energy over another.



◀ The emergence of new supply sources has expanded the world's base of economic natural gas supplies – drilling in the Marcellus Shale in the USA.

The LNG industry is venturing into new territory with the first floating liquefaction project, Petronas FLNG 1, due to start production in 2016.



The maturing of renewable energies such as solar and wind has led to significant cost reductions increasing their competitiveness in many regions. The gas industry will have to advance both in terms of using existing technologies and developing new technologies that

Leadership of IGU Committees and Task Forces 2015-2018

will do everything from improving production, transportation and distribution economics to reducing methane emissions and the environmental footprint of the industry. New supply projects will access stranded and undeveloped natural gas reserves but will come with higher

▼ Table 1.

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technical complexity, risks and operating challenges, and new risk profiles whether in the Arctic or the deep waters of the Atlantic.

In this environment natural gas companies will have to build organizations that are agile and adaptable. Securing the appropriate human capital is going to be critical for gas companies in their efforts to meet future objectives. The gas industry will require professionals commanding both the hard skills allowing comprehension of technical complexities as well as the soft skills to negotiate and develop balanced,

Committee	Chair		Vice Chair	Secretary and Contact
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Workforce Development Task Force		Reham Ahmed Gharib Abd El-Hamid Egypt	ТВА	Madeleine Lafon France
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ACCESS	DEVELOPMENT OF SUPPLY REMOVAL OF BARRIERS TOWARDS INFRASTRUCTURE DEVELOPMENT
MARKETS	INCREASED OPPORTUNITIES TO GROW DEMAND INTEGRATION OF GAS WITH OTHER FORMS OF ENERGY REMOVAL OF MARKET BARRIERS
SOCIAL LICENSE	IMPROVEMENT TO SAFETY AND RELIABILITY REDUCTION OF ENVIRONMENTAL IMPACT DRIVING HIGHER ENERGY EFFICIENCY IMPROVING COMMUNITY ENGAGEMENT

 Figure 1 The USA triennium will focus on three areas of strategic importance.

> sustainable and socially acceptable solutions and approaches to energy markets. Attracting young people, female professionals, developing talent and retaining talent will remain high priorities.

These developments are all occurring against the backdrop of the COP 21 discussions that could provide the political impetus to establish trading schemes that result in a further reshuffling of global energy markets.

"The Best Way to Predict the Future Is to Create It." – Peter Drucker

Through its committees and task forces (see *Table 1*) IGU has assembled teams of experts from all over the world knowledgeable in every aspect of the natural gas business. Committee members will provide facts, expertise and leadership as subject matter experts. Working together, they can share knowledge, learn from each other, and educate key stakeholders and policymakers about the benefits of natural gas and support natural gas as a global energy solution.

While traditionally the objective of the committees and task forces has been to deliver and present their work at the World Gas Conference, the reality of today's energy markets demands that they become much more dynamic, active and engaged in supporting the efforts of the IGU leadership team during the triennium.

The Triennial Work Program lays out the work and activities that the IGU committees and task forces will carry out during the next three years. The aim of the work program is to provide support for the mission of IGU while at the same time contributing to IGU's efforts as the global voice of gas. Great care has been taken to ensure that all the work and activities of the committees and task forces align and support the three areas of strategic focus established for the triennium (see Figure 1).

The deliverables of the committees and task forces will include reports, studies, best practices and presentations specific to their study areas (*see Table 2*). Intermediate deliverables on specific issues and in support of raising the global voice of gas through symposia, seminars, workshops as well as in publications will be necessary.

The Triennial Work Program is launching with the IGU committee meetings this Fall. We encourage members to nominate individuals to these important committees.

Mel Ydreos is the Chair of the Coordination Committee and Terry Thorn is Senior Advisor to the USA Presidency.



Work Plan Summary for the 2015-2018 Triennium

Committee or Task Force	Study Group	Торіс		
Exploration and Production	Megatrends in E&P – A focus on the latest technologies and best practices in natural gas E&P.			
	Conventional Resources	Trends and potential.		
	Unconventional Resources	Unconventional natural gas including shale gas, tight gas, coal-bed methane and methane hydrates.		
	The "Next Big Thing" in E&P	New gas resources and future technologies.		
Storage	Technical aspects of underground storage and its evolving role.			
	UGS Database	Storage projects existing and under way.		
	Best Practices in UGS	Improving storage practices to be more cost-effective and efficient, methane emission reduction technologies, economic management.		
	Utilizing Storage to Support Renewables	New roles for storage: System integrations to support renewables and balance the grid.		
Transmission	Technology, economics, and environmental compliance in gas transportation.			
	Transmission Pipeline Diversification	Modernizing and expanding gas transmission infrastructure; transporting biogas.		
	Effective Operations	Reliable, efficient and environmentally sound operations.		
	Safety & Environmental Performance	Developing integrity management tools and integrity management systems.		
Distribution	Providing reliable, safe and affordable distribution services.			
	Distributing LNG and CNG	Reaching isolated areas with LNG and CNG.		
	New markets through Efficient Gas Grids	Globalizing natural gas markets.		
	Operational Excellence	Best practices, innovation, and environmental excellence in operations and renewable integration.		
Utilization	Utilization of gas in residential, commercial and and marine transportation fuel.	d industrial markets, and the use of natural gas as a land		
	Industrial Utilization	Natural gas used as a fuel source for industrial process loads and electricity generation.		
	Domestic and Commercial Utilization	New residential and commercial gas initiatives, research and evaluation.		
	CNG/LNG as a Transportation Fuel	Vehicle and fuel technology for natural gas.		
	Sub-Task Force on Renewables, CO ₂ Emissions and Hydrogen	Gas from renewable power; global production and use of "green gases" in combination with natural gas.		
	Sub-Task Force on Gas Quality	Natural gas quality and interchangeability.		
Sustainability	Natural gas as part of a sustainable energy mix.			
	Stakeholder Engagement	Fostering a dialogue on the benefits of natural gas; understanding stakeholder perspectives.		
	Environmental Aspects of Unconventional Gas	Gaining public acceptance of unconventional gas supplies.		
	Natural Gas and Renewables	Opportunities for synergy between natural gas and renewable energy.		

Table 2.

(continued overleaf)

Work Plan Summary for the 2015-2018 Triennium (continued)

Committee or Task Force	Study Group	Торіс			
Strategy	Issues related to accessing and transporting new gas supplies, gas pricing policies and best practices in governance and regulation.				
	Long-Term Gas Markets	Longer-term market development issues related to accessing, transporting and using new gas supplies.			
	Wholesale Gas Pricing	Worldwide wholesale gas price formation trends			
	Best practices in Governance and Regulation	What makes a good regulatory environment for expanding gas use?			
Gas Markets	How to position natural gas as a primary fuel source in the future global energy mix.				
	Gas Markets as Supply Drivers	How does market demand impact supply development?			
	Emerging Markets in Latin America, Middle East and South East Asia	What are the barriers to expanded gas use in these regions?			
	New Sources of Gas	How will biogas and methane hydrates impact future markets?			
LNG	Producing IGU's annual World LNG Report; market trends and technology development in global LNG markets.				
	Floating LNG Technologies	The impact of this new technology on the global LNG industry.			
	Competitiveness of LNG	Understanding the state of global competition and how other projects will impact the supply, demand and pricing balances.			
	Enhancing LNG Functionality and Capabilities	Technological developments to improve LNG operations.			
	Sub-Task Force to produce the annual World LNG Report				
Marketing & Communications	New methods to successfully market gas, recommendations on potential strategic affiliations, reaching stakeholders through new conversations and methods.				
	Gas and Clean Air	How gas can clean the air in mega-cities.			
	Public Image and Acceptance	How can the gas industry improve its public image?			
	Using Social Media as a Marketing Tool	Best practices for industry outreach programs to stakeholders.			
R&D and Innovation	Technology: innovation, game-changing capabilities.				
	Current R&D Topics in the Gas Chain	Research supporting improvements to safety, reduction of fugitive emissions, operational cost savings, planning for climate change, and biogas compatibility.			
	Supporting Markets through Innovation	Technologies supporting power-to-gas, efficiency increases, and gas from renewables.			
	Potential of Gas as a Transportation Fuel	Research needs for natural gas vehicles and engines.			
	Sub-Task Force on Renewables, CO ₂ Emissions and Hydrogen	Hydrogen for fuel cells in transportation, CO ₂ reduction.			
	Sub-Task Force on Gas Quality	Natural gas quality and interchangeability.			
Strategic Communications & Outreach Task Force	Developing a communications and advocacy plan to promote natural gas as a key component of the world's energy mix.				
Workforce Development Task Force	Attracting new talent, enhancing the existing work force and assisting in the competence transfer to areas seeking to introduce natural gas into their energy mix. Young professionals program.				

To Shrink Gas Project Risks and Costs, Integrate Diverse Measurements Across the E&P Life Cycle

Aaron Gatt Floridia, President, Schlumberger Reservoir Characterization Group

Given evolving market conditions, natural gas development projects will face increasing challenges in coming years. Over the past decade, the Compound Annual Growth Rate for gas demand is 2.3%. That figure has recently been lowered to 2% going forward.

Due to low oil and gas prices, geopolitical uncertainties, the competitive strength of coal and renewables in certain regions, and massive LNG projects, which will soon increase global capacity, the gas market is quickly approaching a period of oversupply. Achieving strong return on investment will become more difficult unless operators significantly reduce both the risks and costs of gas projects.

In addition to reliable reservoir delineation and reserves estimation, the economics of any gas development project – including the design of completions, wellhead equipment, processing plants, production facilities, and pipelines – is highly sensitive to the precise composition of the effluent.

For example, failing to identify the presence of hydrogen sulfide (H_2S) gas or underestimating its concentration can cost tens of millions of dollars in damage due to corrosion and equipment failure. The HSE risks are also a concern. The greater the contamination, the greater the costs of mitigation. On the other hand, overestimating the H_2S concentration can lead to unnecessarily expensive treatment systems. Accurate measurements are essential to economic success.

Integrated Service Offerings

No matter how accurate, no single measurement is sufficient. It is even more important, however, to *integrate* diverse yet complementary measurements across the reservoir life cycle to minimize uncertainties. Typically, isolated measurements are taken by multiple contractors or various segments of an oilfield service company at different



Figure 1 Delivering a successful natural gas project (green curve) depends on the integration of multiple high-quality rock and fluid measurements, especially at two inflection points (boxes) along the Hydrocarbon Pathway from exploration to production.

points in time – some prior to drilling, some in real time while drilling, others by wireline, and still others during flow testing and laboratory analysis. Each disconnection between measurements, tools, and service providers is yet another opportunity for vital information to fall through the cracks.

Analysis of project failures across the E&P life cycle – called the Hydrocarbon Pathway (*Figure 1*) – indicates that there are two critical inflection points where project value is either lost or enhanced. At each point, the difference between a successful project and a poor project lies primarily in the transformation of multiple rock and fluid measurements into models of what-if scenarios with sufficient scope and granularity to ensure faster, more informed technical and business decisions.

Schlumberger has developed a number of unique, integrated service offerings to support better decisions across the Hydrocarbon Pathway, particularly at both inflection points.

Case Study

For example, one U.S. operator engaged Schlumberger to characterize the reservoir and understand the acreage's variability toward applying a cost-effective completions solution as well as identifying and ranking productive targets for horizontal field development. Integrating measurements from six formation evaluation tools, petrotechnical experts employed unique software platforms to integrate the geological, petrophysical and geomechanical data toward characterizing the reservoir, modeling stresses, deriving mechanical rock properties, and designing optimal completions, which were delivered by using a highly efficient and cost-effective channel fracturing technique.

The operator identified cost savings of \$734,900 per well from using 6% less fluid and 30% less proppant than conventional stimulation. Initial production from the horizontal well was 60% higher than offset laterals, and its 10-month cumulative production was 39% higher, ranking in the play's top 20%.

As shown by the case study, obtaining high-quality measurements is the first step to economic success. The second is integrating workflows across the Hydrocarbon Pathway to quantify uncertainties, mitigate risks, and reduce the costs of today's complex natural gas projects.

LNG is the wave of the future Sempra LNG is excited to be at the forefront

Sempra LNG develops, builds and operates LNG receipt terminals and liquefaction facilities in North America and is active in the sale and purchase of LNG worldwide.

To learn more about Sempra LNG, our projects in development and exciting career opportunities,

visit: www.SempraLNG.com.



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QUICK FACTS

- Sempra LNG developed one of the first liquefaction export facilities in the U.S., Cameron LNG in Louisiana
- We developed the first LNG receipt terminal on the west coast of North America, Energía Costa Azul in Baja California, Mexico
- Liquefaction projects in development: Cameron LNG expansion, Port Arthur LNG in Texas and a liquefaction project at Energía Costa Azul

Sempra LNG is not the same company as San Diego Gas & Electric (SDG&E) or Southern California Gas Co. (SoCalGas), and Sempra LNG is not regulated by the California Public Utilities Commission



Features

This issue's features section starts with a report on preparations for LNG 18. Then we have articles on the CCAC Oil and Gas Methane Partnership, the winner of the IGU Global Gas Award 2015 and one of the runners-up. Next up are profiles of IGU's new members. We round off with a list of publications available from the Secretariat and the events calendar.

LNG 18 – All Eyes on Australia for 2016

By Barbara Jinks

LNG industry leaders from around the world will come together for the 18th International Conference & Exhibition on Liquefied Natural Gas (LNG 18) from April 11-15, 2016 in Perth, Australia. Under the theme "Redrawing the Global Map of Gas", the LNG 18 Conference will present an exciting program over five days focusing on the growing role of LNG in meeting global energy needs. The CEOs of Chevron, Shell and Woodside will jointly open the Plenary Program on "The Transformation of Global Gas". The Opening Plenary will provide some 2,500 delegates with the opportunity to hear the insights of global leaders in the LNG industry. This introduction to the LNG 18 Conference Program will be followed by a Plenary Program which features a veritable who's-who of global LNG industry leaders.



 The LNG 18 team with Dr Nirmal Chatterjee,
Program Committee Chair for LNG 18 (centre) at
WGC 2015 in Paris.



The Program Committee was excited by the record-breaking number of paper and poster submissions and is working towards an unrivalled program for LNG 18. "The high interest in the LNG 18 Program once again shows us how this triennial conference is preeminent in the industry. The papers we have received are of outstanding quality in commercial, technical and operational innovations and we look forward to discussing the latest achievements with participating delegates", says Dr Nirmal Chatterjee, Program Committee Chair. The end result is an exceptional Program with a record number of Paper Sessions, highly topical Workshop Sessions and a dedicated Poster Session that will combine the latest in interactive IT and face-to-face discussions.

The Conference offers a cost-effective program for delegates with all delegate lunches and social functions included in the registration fee*. Registration is now open with the early bird deadline of November 4, 2015. Further discounts may apply by booking accommodation via the Conference Organizers.

The Exhibition at LNG 18 is the largest dedicated LNG gathering in the world with companies ranging from the major global producers through EPCs to specialist suppliers showcasing the newest technical solutions. The Conference and Exhibition are fully integrated and the program schedule provides plenty of opportunities for delegates to spend time exploring the exhibits and maximizing their business and networking opportunities.

The networking program during LNG 18 will be unprecedented with high-level representatives from more than 95 countries and 750 different companies. Some of the networking events include:

Thought Leadership Lunches, which will provide a unique platform for the industry's most influential LNG and gas procurement executives. These luncheons provide a break from the format of the main sessions and a fantastic opportunity to network with colleagues.



- The Opening Ceremony which will be celebrated in the Riverside Theatre at Perth Convention and Exhibition Centre, bringing together thousands of oil and gas industry professionals from across the globe.
- The LNG 18 Welcome Reception will be held in one of Perth's premier locations – overlooking the city but only minutes from the conference hotels. An excellent opportunity to catch up with former colleagues and meet new ones in an informal networking atmosphere whilst enjoying a selection of Australian beverages and food tastings.
- The Conference Networking Event has been added to the Conference Program since LNG 17 to offer delegates more networking opportunities. Delegates will be overlooking the magical Swan River while enjoying a premium selection of local food and beverages.
- The LNG 18 Golf Day on April 11 will take place at Lake Karrinyup Country Club, widely acknowledged as one of Australia's premier golf clubs.
- Four technical tours are on offer for participants to see Australia's exciting new LNG projects in Western Australia and the Northern Territory.

▲ The venue for LNG 18, the Perth Convention & Exhibition Centre, is in the heart of Perth.

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 Technical tours will include a fly-over of the Gorgon LNG project (visit the LNG 18 website for details).

- A range of pre- and post-conference tours to discover the amazing land of Australia, from the awe-inspiring Kimberley region in Australia's north-west corner, to the iconic beauty of the Great Barrier Reef.
- The Closing Ceremony will be celebrated in the Riverside Theatre during which participants will reflect on the success of LNG 18 and look forward to LNG 2019 in China as the official handover takes place.
- A Farewell Networking Event in the Plenary Foyer which will mark the end of the Conference.

Australia is developing the fastest growing LNG industry globally and is on track to becoming the largest LNG exporter in the world by 2020. As part of the Conference Program and the Exhibition, LNG 18 will showcase current world-firsts and innovative projects of floating LNG, subsea technology and coal-bed methane to LNG.

The LNG 18 team was very pleased with the high level of interest in the event at the World Gas Conference 2015 in Paris. At press time, the LNG 18 team is getting ready for a promotion at Gastech 2015 and we welcome you to drop by our stand if you attend. If you have any queries about LNG 18 please visit the official website at www.lng18.org.

We look forward to welcoming you to sunny Perth in April 2016.

Barbara Jinks is Executive Director for LNG 18.

*For details on delegate entitlements please visit the LNG 18 website.

Contacts and Key Date



Conference Organizer Arinex Pty Ltd Email: enquiries@lng18.org Tel.: +61 2 9265 0700 Exhibition and Sponsorship Organizer Exhibitions & Trade Fairs Paul Douglass Email: pdouglass@etf.com.au Registration is now open with the Early Bird deadline on November 4, 2015. LNG 18 Twitter: www.twitter.com/lng18perth Website: www.lng18.org



ORIGIN NATURAL GAS IS KEY TO THE FUTURE.

As the world transitions to a cleaner future, gas will play a prominent role not just for us, but for Australia and the rest of the world. This is why natural gas is a key component of Origin's energy mix. With our broad investment in gas domestically, we're able to supply more than 11% of Australia's gas demands every day. And as the upstream operator and joint venture partner of Australia Pacific LNG in Queensland, we are helping Australia become one of the world's largest gas exporters by 2018. With natural gas in our energy mix, Australia's future looks clean and bright.





The CCAC Oil & Gas Methane Partnership

By Philip Swanson

was launched.

The CCAC Oil & Gas Methane Partnership (OGMP) aims to underpin a sustainable role for gas by helping companies demonstrate a systematic yet pragmatic approach to identifying and eliminating methane emissions. The Climate and Clean Air Coalition (CCAC) launched the Partnership at the UN Secretary General's Climate Summit in September 2014. It now has seven partner companies, though seeks a wider membership to fully meet its vision of increasing confidence in the natural gas sector around the world.

The CCAC is a group of over 100 governments, international organizations and NGOs UN Secretary General working together to reduce short-lived climate Ban Ki-moon addresses the Climate Summit at pollutants such as methane. The Secretariat of which the CCAC Oil & the CCAC is hosted by the United Nations Gas Methane Partnership Environment Programme (UNEP). CCAC govern-



ments, many of which anticipate an increased role for gas in their economies, are concerned that methane emissions undermine the climate benefits of increased gas use.

In 2013 the CCAC began a year and a half consultation process with the oil and gas industry, NGOs, governments and investors. The goal was to develop a solution that met the needs of stakeholders while also being implementable by oil and gas companies.

The International Energy Agency's 2015 special report, Energy and Climate Change, proposes "reducing methane emissions in oil and gas production" as one of five priority climate policies. Gram for gram, methane is over 84 times more potent in the atmosphere than CO₂ over a 20-year time horizon, and the oil and gas industry is the largest man-made emitter of methane after agriculture. According to a 2015 Rhodium Group report commissioned by the Environmental Defense Fund, about 3% of produced gas escapes as methane emissions worldwide on average - in addition to gas which is routinely flared. The often-heard statement that "gas is cleaner than coal" will only be widely accepted if methane emissions are shown to be managed.

Founding partner companies of the CCAC Oil & Gas Methane Partnership are BG Group, ENI, PEMEX, PTT, Southwestern Energy, Statoil and Total. Several of these are members of IGU. All IGU member companies are invited to join the Partnership and help ensure the climate credentials of natural gas. Recognizing their many common interests, IGU and UNEP signed an MoU in June 2015 calling for cooperation in a number of areas, with special emphasis on the CCAC Oil & Gas Methane Partnership.



How it works

A company joining the CCAC Oil & Gas Methane Partnership starts by signing an MoU with UNEP, the legal representative of the CCAC. This MoU voluntarily commits the company to the following in its participating operations:

- Surveying for nine "core" sources that have been found to account for much of the methane emissions in typical upstream operations (see box);
- Evaluating existing cost-effective technology options to address unmitigated sources; and
- Reporting progress on surveys, project evaluations and mitigation projects in a transparent, credible manner that demonstrates results.

The partnership has been designed together with industry to provide real-world flexibility. Companies are expected to continuously increase the share of assets they include in the initiative, though do so at their own pace, and there is no minimum share of assets that a company must start with. The emphasis is on companies learning by doing and on achieving continuous improvement over time, with a focus on relatively low-cost,

The nine "core" methane emission sources in typical upstream oil and gas operations

- Natural gas driven pneumatic controls and pumps;
- 2 Fugitive equipment and process leaks;
- 3 Centrifugal compressors with "wet" (oil) seals;
- 4 Reciprocating compressors rod seal/packing vents;
- 5 Glycol dehydrators;

- Hydrocarbon liquid storage tanks;
- 7 Well venting for liquids unloading;
- 8 Well venting/flaring during well completion for hydraulically fractured wells; and
- 9 Casinghead gas venting.

scalable and operationally simple activities to reduce emissions.

According to present partner companies, the main advantages provided by the CCAC Oil & Gas Methane Partnership include the following:

- The credibility of a public-private partnership in recognising the company's past and present efforts to reduce methane emissions;
- Increased product recoverability leading to increased gas sales volume and revenue;

• Core methane emission sources include reciprocating compressors.



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- Operational and safety benefits through enhanced asset integrity;
- Harmonisation with other reporting and disclosure standards;
- Best practice sharing and support; and
- Development of a reliable industry data set to underpin the climate credentials and growth of natural gas.

The Partnership benefits greatly from the political support of key CCAC governments, including France, Nigeria, Norway, the United Kingdom and the United States. These are supporting the Partnership because of the importance they place on accelerating reductions of short-term climate forcers like methane.

Key technical partners include the Environmental Defense Fund, the US EPA's Natural Gas STAR program, the Global Methane Initiative and the World Bank's Global Gas Flaring Reduction Initiative. The Partnership also has investor support, e.g., three international investor groups representing over \$20 trillion in assets issued a joint statement calling on companies to join the CCAC Oil & Gas Methane Partnership.¹

1 Joint investor statement by IIGCC, INCR and IGCC: http:// www.iigcc.org/publications/publication/joint-investorstatement-on-methane-emissions-in-support-of-ccac There is no fee for participation and no financial penalties. Moreover, the CCAC supports a participating company's efforts, including with technical assistance and by encouraging development of government policies and practices that promote and support oil and gas methane emission reduction activities within CCAC member countries and beyond.

The CCAC is working towards the next cohort of companies joining the initiative around the time of COP 21 in Paris, and would be pleased to have more IGU members as part of that group. Companies announcing their participation at or before the COP in Paris will not only highlight their leadership on the world stage, but also provide a tangible example of their commitment to be part of the climate solution. Interested companies are encouraged to contact the author for further information (philip.swanson.affiliate@unep.org), including opportunities to talk to current partner companies about the advantages they see in this initiative for individual companies and the industry as a whole.

Philip Swanson is the Administrator of the CCAC Oil & Gas Methane Partnership.



• The CCAC is working towards the next cohort of companies joining the initiative around the time of COP 21.



Strong Commitment to Deliver a Good Energy Solution

We are committed to ensuring that Indonesia could continue to benefit from natural gas that is not only efficient, but also environmentally friendly. Therefore, PGN continues to encourage the amplification of the natural gas industry chain as sustainable Good Energy Solution





"Opening Up the Gas Market" Wins IGU Global Gas Award 2015

By Angus McIntosh

✓ One small Scottish community may well be about to change the gas industry for the better – Oban's gas network was chosen for the "Opening up the Gas Market" project.

Angus McIntosh accepts the IGU Global Gas Award 2015 from Maria van der Hoeven, Executive Director of IEA and a member of the Judging Panel. SGN's "Opening up the Gas Market" project won the IGU Global Gas Award 2015 and aims to tackle many of the challenges faced today within the energy trilemma by ensuring gas supplies are clean, secure and affordable. SGN owns and operates the network that delivers natural gas to 5.8 million homes and businesses in Scotland and the South of England.

The UK is now a net importer of gas, with prices and access to supply increasingly depending on international markets. Hence, UK gas prices exhibit volatility, given the short-term and/or spot market conditions. While the sources of new natural gas are numerous, gases have different compositions and the specification for gas composition in England, Scotland and Wales (GB) within the UK is very prescriptive, therefore limiting the gas market.

Current arrangements dictate that in order for gases with compositions that sit outside of

GB's gas quality specification to be conveyed and used within GB, expensive gas processing is required to bring them within these specifications. A key limiting factor is the Wobbe Index. This limits the type and source of gases which can be used in the UK and, in turn, ultimately leads to increased costs for the consumer.¹ If we can widen the range of gases the network can accommodate without processing, this will reduce the costs for the customer and perhaps open the market to new sources.

The Opening up the Gas Market project seeks to demonstrate that gas, which meets the European Association for the Streamlining of Energy Exchange-gas (EASEE Gas) specification but sits outside of the characteristics specified within GB Gas Safety (Management) Regula-

1 Current estimate of £325 million (\$500 million) in GB from National Grid.







tions (GS(M)R) 1996, can be distributed and utilised safely and efficiently in GB. To simplify, the EASEE gas specification was proposed to try to accommodate the different gas compositions distributed in the European Union and minimize processing between member states. Furthermore, the sources of gas being injected into the networks are more varied than ever before.

Therefore the limits EASEE Gas proposed were very much aspirational.

The Wobbe Index (WI) is the key parameter in this aspiration. Indeed, it is arguably the most important quality parameter in regard to the combustion of natural gas. Gas appliance technology has undergone decades of development reflecting the properties of the natural gases normally used in the respective counties. As a result European Union member states have developed and specified different WI ranges to ensure safe, low emissions and efficient operations.

The WI is a measure of the amount of energy delivered to a burner via an injector. It is an indicator of the compatibility between the natural gas supplied and the burner.

The WI is defined as: **Wobbe Index =** $\frac{GCV}{\sqrt{\text{Relative Density (d)}}}$

where d is the relative density of natural gas compared to air. GCV is the gross calorific value, or the amount of heat released by the complete combustion of a unit of natural gas. The WI is expressed in MJ per cubic metre of gas. The WI impacts on the appliances fed by the gas network. Too high or too low and there is a risk of greater emissions of carbon monoxide (CO) through incomplete combustion. So it is necessary to prove that any change to the limits of the WI do not increase the risk of CO poisoning to occupants of the properties where the appliances are being used.

For our demonstration project, we aim to prove, through statistical sampling, that gas appliance installations in GB are capable of burning gases with a wider quality variation (either richer or leaner WI) than currently per-



mitted in GB. Following the successful testing of appliances, a pilot trial is now being conducted by conveying rich WI gas (that sits outside the GB specification) through the network.

In order to do this, we have been afforded a unique opportunity to utilize one of our discrete independent undertakings, the Oban gas network. Oban is a town in the Highlands of Scotland and is statistically representative of GB on a socio-economic level (essentially a microcosm). The 1,104 gas properties in Oban contain a representative snapshot of the range of appliance types and models likely to be out there in GB. This enables us to evaluate the potential for this solution to be scaled to GB.

There are three stages of the project.



Stage 1 – appliance survey and detailed laboratory testing

In Stage 1 a survey of gas appliances in 100 randomly selected customer properties in Oban was conducted in summer 2014. The survey ▲ Figure 1 Gas Source Wobbe Index Comparison at 15°C and 15°C (UK reference conditions).

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results provided an understanding of appliance stock in Oban, recording their make, model, condition and manufacturer details. During this time, if any appliances encountered were considered to be unsafe or in need of repair, we replaced or repaired them for free.

The appliance types present within the appliance survey data are likely to be typical and representative of the entire appliance population in Oban, which enabled the use of a selection rationale by which to choose a cross section of 18 appliances of various types for laboratory testing using gases over an extended WI limit (45.66-54.76 MJ/m³) that exceeded the current GS(M)R.

These 18 appliances were selected by each class (cooker, local space heater, boiler or commercial catering equipment) in combination with additional criteria such as manufacturer, product type, flueing, control type, age and condition. They were then put through their paces in laboratory conditions, testing each appliance across the full EASEE gas range and in various simulated scenarios, such as no ventilation, poor maintenance and long-term tests. These laboratory tests concluded that there was no increase in inherent risk due to the variation in WI.

Figure 2.



The results from laboratory tests have demonstrated unequivocally that gas appliances correctly installed, serviced and operated can safely burn gas with WI of up to 53.25 MJ/m³.



Stage 2 – in-situ appliance testing in all 1,104 customers' properties

The project is now approaching the final phases of Stage 2, which began in November 2014. Since then, 1,745 appliances across 987 properties have been tested using three different compositions of natural gas² on their appliances. With our contractor Kiwa Gastec, we designed and built our own portable testing vehicles specifically catered to the project's requirements to allow these gases to be transported to each property.

During the tests appliance gas combustion performance has been recorded and analyzed. Appliances which do not pass the test performance criteria, e.g. those exhibiting high CO emissions, are replaced by the project free of charge and all customers receive a complimentary CO detector.

The results from the field tests have also demonstrated that appliances correctly installed, serviced and operated can safely burn gas with WI of up to 53.25 MJ/m³. Of the appliances tested in Oban up to end July 2015, approximately 95% are judged to fall into this category. The remaining 5% are considered "At Risk" or "Immediately Dangerous", as per the Gas Safety (Installation & Use) Regulations and the guidance given in the Gas Industry Unsafe

2 G20 (WI 50.72 MJ/m³), G21 (WI 54.76 MJ/m³), G23 (WI 45.66 MJ/m³).



Situations Procedure, though we must stress this is due to the pre-existing condition of the appliance rather than the variation in gas. Laboratory tests have shown an increase in WI to 53.25 MJ/m³ would not expose the consumer to any further risk than that already posed from the appliance. Enough evidence was provided from the appliance testing for Oban for us to agree an exemption to the Gas Safety Management Regulations (GSMR) with the Health and Safety Executive (HSE). The HSE is the GB safety regulator. We carried out a quantitative risk assessment benchmarking CO risk against other household risks to illustrate, *see Figure 2*.



Stage 3 – 1 year trial distributing rich Wobbe Index gas through the network

For the final stage, a source of gas with a higher quality than already used in the network has been chosen and will be injected into the Oban network for one year. During this period, we are revisiting 200 customers' properties to test how their appliances are performing.

On Monday July 6, 2015 at 8.05am, we made gas industry history by injecting the first load of liquefied natural gas (LNG), all the way from Zeebrugge (*see Figure 3 on page xxx*), into our Oban network.

Since then all our appliance checks have been positive. We are surveying the network to see if the increased WI will translate into increased energy delivery capacity too.

Customer and stakeholder engagement has been an essential ingredient to the success of this project. We've had to ask homeowners in Oban to give up an hour of their time to carry out the testing in-situ. At a local level in Oban, the customers need to be engaged to allow access to their properties in order to test their appliances. This has required much emphasis to be placed on communication activities and material. The project is also working alongside the local council, community groups and businesses to help ensure access to customers' properties and in turn improve the results.

An example of some of the local stakeholder initiatives undertaken by the project include the project team hosting a "cooking with gas" event whereby a professional chef provided cookery demonstrations for the local community.

Other examples are SGN sponsoring the Oban Winter Festival, drop in sessions in the town hall to provide an opportunity for customers to ask questions and even showing the project film³ as a trailer before films in the Oban cinema.

3 The project film can be found at www.sgn.co.uk/oban.

 Offloading the first tanker containing "rich" LNG in Oban.



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Figure 3.

 As part of the local stakeholder initiatives a "cooking with gas" event was organized.



To conclude, project results so far indicated that there is no reason to suggest WI cannot be increased to at least 53.25 MJ/m³ in GB.

As a further benefit of the work we are doing in Oban, the project has removed or rectified any dangerous appliances that we have encountered in customers' homes so far for free. Furthermore, we have issued every customer with a free CO alarm.

Feedback from customers and stakeholders to date has been overwhelmingly positive.

Following this project, the results will be collated from which a conclusion can be drawn on a proposed safe WI limit for GB and a roadmap for rollout from Oban, to our other independent undertakings, to the GB network, and possibly to other parts of Europe.

Angus McIntosh, Innovation & New Technology Manager, SGN (www.sgn.co.uk).







100% INDEPENDENT FROM ANY PRODUCER OR SUPPLIER OF GAS OR ELECTRICITY Fluxys as a gas infrastructure company seeks to foster the integration of the European gas market through the development of a cross-border infrastructure backbone linking gas sources to markets, bridging the markets and gas trading places, and providing security of supply.

Fluxys is convinced that gas and gas infrastructure will continue to feature as core components of an affordable energy mix for tomorrow's low-carbon economy.

- Gas is the cleanest fossil fuel with the lowest carbon footprint and the lowest emissions impacting health.
- Gas infrastructure and gas-fired power plants provide the flexibility required to complement variable power generation from renewable sources.
- Gas infrastructure is a highly versatile asset for transmission and storage of large quantities of energy at low cost. New technologies such as power-to-gas will make the gas system even more flexible in the future energy landscape.

Smart Energy Grid Aspects Related to Gas

By Jos Dehaeseleer, Tim Cayford, Benjamin de Ville de Goyet and Ilir Kas

Figure 1.

A joint task force of Marcogaz, Eurogas and GERG has prepared a status report evaluating gas in a smart grid context, taking into account the current technologies and functionalities implemented by the European gas industry. The report was presented at WGC 2015 during Strategic Panel 8 "How smart energy grids and digitization are shaping the future of utilities" and was a finalist for the IGU Global Gas Award 2015.

Greenhouse gas emissions, European energy import dependency, increasing energy demand, affordability and many other factors cause decision-makers to rethink energy use, produc-





tion, transportation and storage. In order to achieve the energy efficiency goals, the energy industry and the European Commission strongly support the development of smart energy grids.

The natural gas industry is convinced that a smart grid only for electricity, heat or gas is not efficient and that it is important to develop smart and integrated networks which function as components of a holistic energy system, including gas, electricity, heat and information and communication technologies (ICT). Further, the empowerment of the end user must predominate in order to achieve the European energy efficiency and CO₂ reduction goals.

Figure 1 shows an overview of an integrated energy system where the customer, the electricity grid and the gas grid are linked in such a way as to optimize the usage as well as production, transport and distribution of energy. This is facilitated by the ICT network in order to increase desperately needed flexibility in an energy system where intermittent renewable energy is increasingly deployed.

The gas grid is no longer just a network of uni-directional pipes carrying natural gas from a well to a burner.

Gas networks allow for cutting-edge innovative solutions for renewable energy implementation. For instance, power-to-gas projects show that gas networks can be used to store and transport the excess production of green power in the form of hydrogen or methane. Already, non-conventional green gases like biomethane are injected into the existing natural gas grids. New distribution networks which allow gases from renewable sources are currently being tested.

Gas networks, through the existing grid, also have the ability to store a large amount of energy and thus are much more flexible than electricity networks.

The use of gas in local combined heat and power (CHP) appliances, in micro-CHPs, dual fuel appliances, fuel cells, gas-fired heat pumps and cooling systems will lower demand peaks



▲ Jos Dehaeseleer (right), representing all the authors, receives the certificate (INSET RIGHT) for their report which was a finalist in the IGU Global Gas Award 2015 from Prof. Dr-Ing. Rainer Reimert, Karlsruhe University, Germany (*left*) and Jérôme Ferrier, IGU President (*centre*).

<text><text><text><text><text><text><text><text><text><text><text><text>

in the electricity network and empower the end-user to optimize their energy use by allowing them to participate actively in the energy market.

The use of gas is extended to mobility with compressed natural gas (CNG) refuelling stations for cars, buses and trucks and liquefied natural gas (LNG) for trucks and ships.

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Power-to-gas projects like this one in Falkenhagen, Germany show that gas networks can be used to store and transport the excess production of green power in the form of hydrogen or methane.

> Gas networks are embedded in an increasingly complex technical environment. Smart monitoring and the introduction of new techniques of more "active" control will optimize grid operation and will lead to a more efficient network which allows additional functionalities. Associated information and communication networks should be safe, secure and robust to respect the fundamental rights and freedoms of end-users.

The natural gas industry has been an increasingly active contributor toward a smarter energy system. The Marcogaz-Eurogas-GERG status report with accompanying database gives a regularly updated detailed overview of some European projects towards a smarter gas grid as part of a smart energy system. This report is available on www.marcogaz.org and is augmented by a video available in several languages on www.eurogas.org.

Conclusion

The importance of gas and gas smart grids in future energy production, transportation and use in Europe should not be underestimated. Gas grids play a central role in the overall energy production, transport and usage thanks to their flexibility and compatibility with renewables. The storage abilities of gas and energy convertibility to gas will solve many of the problems already identified in order to attain future energy efficiency in a sustainable way.

The smart gas grid concept is based on maximizing the efficiency of overall energy usage by taking full advantage of all the opportunities that gas and the gas grid can offer.

Jos Dehaeseleer, Marcogaz; Tim Cayford, Policy Advisor, Eurogas; Benjamin de Ville de Goyet, Technical Advisor, Marcogaz; and Ilir Kas, Senior Advisor, Synergrid.

PERÚ: A Country with Great Potential for Hydrocarbon Exploration

18 sedimentary basins with possibilities for huge discoveries

Peru is located within the sub-Andean mega trend, one of the most prolific hydrocarbon trends of South America.

Hydrocarbons production in Peru began 140 years ago on the northern coast and, from the early 1950s, the Peruvian jungle.

There are 18 sedimentary basins with hydrocarbon potential, located in offshore, coastal, mountain and jungle areas. Of these, only three (Talara, Marañon and Ucayali) currently have oil, gas and condensates production.

In terms of exploration, 84% of all the exploratory wells drilled in the country are located in these three basins. These facts point to Peru being an under-explored country in terms of hydrocarbons.

Peru has resources to discover and this is one of the challenges PERUPETRO has highlighted, to encourage oil exploration given the opportunities the country has in this regard; its oil history, the vast range of potential structural and stratigraphic traps and the confirmed presence of plentiful source rocks in all its basins.

All of these elements make Peruvian territory a favourable geological space to search for oil and gas.

During recent years important investments have been made in heavy oil production in the northern jungle and in natural gas and condensates production in the Camisea fields and adjacent blocks.

It is important to mention the development of the huge Camisea gas fields (Cusco), the License Contract for which was signed in 2000, opening a new stage in Peru's energetic hydrocarbons sector. Camisea has increased Peru's natural gas reserves and hydrocarbons production, starting the change of the energy matrix and generating great benefits for the population, industries and the country as a whole.

In terms of natural gas, Peru is the fourth largest natural gas power in the region with 15 trillion cubic feet (tcf) of proven reserves, higher than those verified in its neighbours Bolivia, Colombia and Brazil.

If we consider the category of probable reserves, we surpass 30 tcf, which means we have gas for many years, in addition to the ability of continuous exploration.

This year wells are scheduled to be drilled in different basins in Peru, in Madre de Dios and Ene river, areas with tremendous gas potential.

Another challenge for PERUPETRO S.A. is to reach energy self-sufficiency with strict protection of the environment. We are convinced of, and committed to, the necessity to increase the country's oil and gas reserves and this will only be possible through intense exploration. With this in mind, we are performing great efforts to promote the reduction of delays in acquiring permits for investments.

The main attractions for investors in Peru, consist of favourable contracting conditions, economic and juridical stability and an adequate tax system, within other conditions that make hydrocarbon exploration and exploitation activities attractive in our country.

We should also mention the Prior Consultation Process, which has being developed for more than a year and shown success in the blocks under promotion, reducing conflicts that could arise between communities and contracting companies.

For the past 21 years PERUPETRO S.A. has been committed to the development of the country's energy sector. Our company has contributed to the promotion and development of Peru's hydrocarbon resources, keeping a constant and harmonious dialogue between the State, communities and investors.

For further information, please contact: promotion@perupetro.com.pe.

Presenting IGU's New Members

At the Council meeting in Paris in June, IGU welcomed two new Associate Members. Each has been invited to contribute a short profile.

Beijing Gas Group

Beijing Gas Group is the



largest town gas company in terms of its operational scale in a single city in China. In line with a policy of reducing air pollution and increasing the use of clean-burning natural gas, the Group has steadily widened its customer base. Natural gas is expected to account for more than 20% of the primary energy consumption in Beijing by the end of 2015. In 2014, Beijing Gas Group supplied 10.5

bcm of gas to 8 million consumers, operated

13,000 people. In addition to its downstream

more than 20,000km of pipelines and employed

 Beijing Gas Group has steadily widened its customer base.



operations, the Group's activities cover the development of unconventional gas in the upstream sector and the construction and operation of transmission pipelines and storage facilities in the midstream sector.

Beijing Gas Group co-hosted the IGU Council meeting in Beijing in October 2013. It then went on to play a key role in China's bid for the IGU Presidency 2018-2021. Through its campaign, Beijing Gas Group established close contacts with IGU members and raised China's profile in IGU. Now the Group is building on this by becoming an Associate Member. The aim is to enhance communication with fellow members and strengthen international cooperation on energy policy, R&D, innovation and human resources.

For more information, visit www.bjgas.com.

Enagás



Enagás is an international midstream company present in eight

countries: Spain, Mexico, Chile, Peru, Sweden and, with the Trans Adriatic Pipeline (TAP) project, Greece, Albania and Italy.

It is a leading global LNG company, first in the world by number of LNG regasification terminals and third by regasification volume.

Enagás is accredited as an independent Transmission System Operator (TSO) by the European Union.

Over the course of its more than 45-year history, Enagás has developed the key infrastructures for the Spanish gas system, transforming it into a benchmark for security and diversification of supply. The company is the main gas basic infrastructure operator in Spain,



whose business is the construction and operation of the transmission grid, LNG plants and underground storages. The company is the main carrier of natural gas in Spain, with more than 11,000km of pipelines, and also the Technical System Manager.

Enagás is a leader in sustainability, good governance, knowledge and innovation in the sector.

Enagás is a listed company on the Spanish stock market, Ibex 35, with a 95% free float. The greatest share of the free float comes from Continental Europe, the UK, the US and Canada.

Spain has four EU cross-border gas pipeline interconnection points, two with France and two with Portugal. Additionally, there are two non-EU cross-border points, one with Algeria and the other with Morocco. All of these are operated by Enagás on the Spanish side of the border.

Benefits of becoming an IGU member

Enagás has been a longstanding participant in IGU activities under the umbrella of its national Charter Member. The company has now decided to enhance and reinforce its involvement by becoming an Associate Member in light of the growth of the global gas industry.

IGU provides an excellent platform where industry experts meet and share their experiences in the different areas of work along the gas value chain. They also develop relationships where they bring together their knowledge and cooperate in achieving the objectives of the industry.

Enagás considers that the company can at the same time learn from other experts and contribute to IGU's activities, sharing its expertise in the construction and management of basic infrastructures and their associated areas.

Furthermore, the main mission of IGU is to advocate gas as an integral part of a sustainable global energy system, and to promote the political, technical and economic progress of the gas industry. Enagás can share its experiences as one of the key partners participating in several advocacy initiatives in favour of natural gas remaining a key fuel for the future energy mix. The company can also benefit from the advocacy that IGU provides at the global level.

For more information, visit www.enagas.com.



Enagás is a leading global LNG company, shareholder of several LNG terminals in Spain and abroad, including this one in Barcelona.

IGU

Publications Available from IGU

As a non-commercial organization promoting technical and economic progress in the gas industry worldwide, IGU offers its publications free of charge.

You are invited to download the publications currently available from the IGU website www. igu.org or order hard copies (if in stock) from the Secretariat.



International Gas Union News, views and knowledge on gas – worldwide

World LNG Report - 2015 Edition World Gas Conference Edition c/o Statoil ASA Box 3 NO – 1330 Fornebu Norway

Tel: +47 51 99 00 00 Fax: +47 67 80 56 01 Email: secrigu@statoil.com

Reports launched at WGC 2015

World LNG Report – 2015 Edition Wholesale Gas Price Survey – 2015 Edition – A global review of price formation mechanisms 2005-2014



OTAL



Biogas – from refuse to energy Prospects for Natural Gas: Identifying the key developments that will shape the gas market in 2050

Other publications

IGU Articles of Association IGU Annual Report IGU General Brochure Triennial Work Program 2015-2018 Shale Gas – The Facts about the Environmental Concerns Natural Gas as a Transportation Fuel Global Vision for Gas – The Pathway towards a Sustainable Energy Future IGU Natural Gas Conversion Guide IGU Natural Gas Conversion Pocketbook International Gas Union 1931-2012 International Gas, back issues of the bi-annual IGU Magazine Please check the IGU website for other (older) publications which are still available from the IGU Secretariat.

TRIENNIAL WORK PROGRAM

015-2018

Fueling the Future

IGU



International Gas Union News, views and knowledge on gas-worldwid



Prospects for Natural Gas

Identifying the key developments that will shape the gas market in 2050



CONFEEENCE 2018



REPORT 2015



IGU Events and Other Major Gas-Related Events 2015-2016

2015

October 20-23 IGU Coordination Committee, Executive Committee and Council Meetings Cartagena, Colombia

October 27-30 Gastech Conference & Exhibition Singapore November 25-26

European Gas Technology Conference (EGATEC 2015) Vienna, Austria November 30-December 11 21st Session of the Conference of the Parties to the UNFCCC (COP 21) Paris, France

December 5 IGU COP 21 Gas Day Paris, France

2016

April 5-7 IGU Executive Committee Durban, South Africa April 11-15 LNG 18 Perth, Australia IPLOCA 50th Anniversary Convention Paris, France September 21-23 GASEX 2016 Conference & Exhibition Beijing, China September 27-29 29th World LPG Forum & 2016 AEGPL Congress Istanbul, Turkey October 4-7 NGV Global 2016: 15th Biennial Conference & Exhibition St Petersburg, Russia

September 12-16

October 9-13 23rd World Energy Congress Istanbul, Turkey

October 18-21 IGU Coordination Committee, Executive Committee and Council Meetings Amsterdam, The Netherlands

November 7-18 22nd Session of the Conference of the Parties to the UNFCCC (COP 22) Venue TBA

Acknowledgements

For the IGU Secretariat

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Cover: WGC 2015 (top: the closing ceremony of WGC 2015 with the handover from France to the USA); Vienna Energy Forum (David Carroll, IGU President, speaking

at the panel discussion on "Energy Efficiency for Competitive Industries" during the 2015 Vienna Energy Forum, which was held in the Hofburg Palace); Harald Pettersen/Statoil (Workers at the Kårstø gas and condensate processing plant).

Message: IGU (10), WGC 2015 (11).

IGU Organization: GTI (David Carroll, 21), IGU (Mel Ydreos, Pål Rasmussen & Luis Bertrán Rafecas, 21), Korea Gas Union (Jae Ho Song & Gi Chul Jung, 21), AFG (Jérôme Ferrier, 21).

News from the Secretariat: IGU (all except UNESCO/Emilien Urbano, 25 lower).

Building for the Future: IGU.

IGU Council Meets in Paris: AFG/Gael Kazaz.

IGU Executive and Council Meetings Being Restructured to Deliver Greater Value to the Membership: SurReal/ Naturgas (46), Nexen Inc. (47).

Reports from the Regional Coordinators: Bjørn H. Stuedal (50 upper), Anadarko Petroleum Corporation (50 lower), Total (51 upper), Felipe Scilipoti/YPF (51 lower), Canadian Gas Association (52), Cheniere Energy Inc. (53).

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WGC 2015 – The Gas World Meets in Paris: WGC 2015. WGC 2015 – Global Perspectives on the Future for Natural Gas: WGC 2015 (78, 79, 80, 82, 84, 85, 86 upper & 88), Ole Jørgen Bratland/Statoil ASA (86 lower). A Wide-Ranging Agenda for WGC 2015: WGC 2015.

WGC Youth Event Highlights Opportunities and Challenges: WGC 2015 (100, 101, 102 & 104 lower), Marco Dufour/ Total (104 upper).

Women's Place in the Gas Industry: WGC 2015.

Challenges and Opportunities for Natural Gas in Transport: Blue Corridor (114), Karl Gabor/AGA Gas AB (115), MAN (116 upper), Dennis Finn Studios/www.filmeye.com (116 lower), Clean Energy Fuels (120), Paul McMillan (121).

Post-Conference Reports from the Committees and Task Forces: WGC 2015.

The USA Presidency Gears Up to Lead the IGU Triennium and Tackle the Complex Challenges Facing the Global Gas Industry: IGU (144 small pictures, 146 & 147), Helge Hansen/Statoil (144 main), Petronas (145).

LNG 18 – All Eyes on Australia for 2016: Arinex Pty Ltd (154), Tourism Western Australia (155), Chevron Australia Pty Ltd (156).

The CCAC Oil & Gas Methane Partnership: UN Photo/Yubi Hoffmann (158), GE Oil & Gas (159), Southwestern Energy Company (160).

"Opening up the Gas Market" Wins IGU Global Gas Award 2015: SGN (162 left, 165 & 166), WGC 2015 (162 right).

Smart Energy Grid Aspects Related to Gas: Eurogas/ Marcogaz/GERG (168), WGC 2015 (169), E.ON (170).

Presenting IGU's New Members: Beijing Gas (172), Enagás (173).



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With a vision to be a world-class energy company, we continuously improve our performance by increasing production of oil and gas, as well as renewable energy. It is why we received international recognition as one of the Fortune Global 500 companies.

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