Industry to step up action on methane

INDUSTRY leaders see massive potential in reducing emissions of methane from natural gas production and distribution, boosting the environmental image of gas and making it more competitive against alternative fuels.

Total looks to the benefits of LNG expansion

Suitors keen on North Field position in Qatar

Oil price falls
Crude drops after Opec and Russia agree to increase output. Page 17

Anadarko outlook
Gas takes centre stage for US producer. Pages 18&19

Bechtel scoop
Contracting giant lands deal for Port Arthur LNG facility. Page 22

Key role for gas
BP ready to make the case for gas in energy transition. Page 8

Trinidad wildcat
BHP spins drillbit at Victoria prospect. Page 23

Leading the way
US is on course to head global gas growth. Page 24

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First Chevron Wheatstone LNG Cargo Departs for Japan
**Total looks to LNG expansion potential**

French producer Total is looking to flex its muscles in key sector and it favours brownfield investment for growth

**EOIN O’CINNEIDE and KATHRINE SCHMIDT**
Washington, DC

French major Total is looking to bolster its already significant liquefied natural gas portfolio, with brownfield expansion projects — such as in Qatar and Nigeria — seemingly leading greenfield schemes in the race for investment dollars.

The company is already the second-largest LNG player among international oil and gas operators — after Shell — with 40 million tonnes per annum of production through participation in projects such as Nigeria LNG (NLNG), Angola LNG and Qatar’s North Field.

Speaking at a media briefing before the World Gas Conference, chief executive Patrick Pouyanne said: “We are working in order to be a participant in the next wave of expansion.”

In Nigeria, Total and its partners have revived a plan to add production capacity, after shelving plans years ago for the addition of huge, new trains.

The so-called Train 7 expansion will involve an additional 7.1 million tpa to take total capacity to 30 tpa, by adding two new small trains. "NLNG is one of the projects where we want to expand — one of the best projects in the world,” Pouyanne said.

In Russia, Total is looking to follow up on its participation in Yamal LNG — alongside local independent Novatek — with the Arctic LNG 2 project, where it has set its sights on a more cost-competitive scheme.

Pouyanne said Total is aiming to lower capital expenditure on Arctic LNG 2 by around 30%, “because we have taken some lessons from the first one with some gravity-based structures”.

At the Papua LNG project in Papua New Guinea, Total is targeting three new trains, having decided on a brownfield over a greenfield project.

“If it is just adding trains and you can capitalise on your existing joint partnerships or existing gas storage facilities, it is favourable,” Pouyanne said.

In the US, Total holds a stake in Sempra Energy’s Cameron LNG development in Louisiana, where there is capacity to expand from three to five trains, while it is also invested in Tellurian’s planned Driftwood LNG project in Texas — the latter of which would be a greenfield development.

“Obviously, the expansion of Cameron LNG will be more competitive, but we are looking at both options,” Pouyanne said.

With Cameron LNG we are integrating the value chain. We are more fully integrated between our gas production, what we will liquefy and what we will offshore,” he said.

**Apache in pipe deal**

**Apache in pipe deal**

US INDEPENDENT Apache has entered an agreement with pipeline player Kinder Morgan and Blackstone-backed EagleClaw Midstream to develop a $1 billion pipeline project to carry natural gas from the booming Permian basin to the Texas coast.

The trio signed a letter of intent to pursue the proposed Permian Highway Pipeline, a 410-mile line with a capacity of 2 billion cubic feet per day.

The proposal comes as Permian production outpaces takeaway capacity, causing operators to scramble for solutions to get their product to market.

**Sempra prize**

**Sempra prize**

US OPERATOR Sempra Energy has awarded an engineering, procurement, construction and commissioning contract for the Energia Costa Azul liquefaction project under development in Baja California, Mexico, to a TechnipFMC and Kiewit partnership.

The deal will see the Technip-FMC-Kiewit partnership perform engineering, planning and related activities necessary to finalise a lump-sum EPC contract for the project.

**Sharjah round**

**Sharjah round**

SHARJAH has launched its first onshore licensing round, offering three areas to bidders.

The round, which opened on Monday and includes three areas, is being carried out by Sharjah National Oil Corporation. The three areas on offer — A, B and C — include an unappraised deeper gas discovery below the Saajah gas condensate field in Area A.

Sharjah is part of the United Arab Emirates.

**Tartaruga start**

**Tartaruga start**

BRAZILIAN oil and gas giant Petrobras has started production from the Tartaruga Verde field in the Campos basin.

Production began on 22 June via the Modec-owned Cidade de Campos dos Goytacazes floating production, storage and offloading vessel. The FPSO has capacity to produce 150,000 barrels per day of oil and 5 million cubic metres per day of natural gas.
Industry leaders see huge gains from cutting methane

Top-level players pinpoint curbing emissions from gas production as a key area for improvement with resulting competitive benefits

BEATE SCHJOLBERG and JULIA MARTINEZ
Washington, DC

INDUSTRY leaders see massive potential in reducing emissions of methane from natural gas production and distribution, boosting the environmental image of gas and making it more competitive against alternative fuels.

About 1.7% of the world’s natural gas production is leaked into the air as methane every year, the bulk of it from Russia and other former Soviet states, followed by the Middle East and North America, according to the International Energy Agency (IEA).

“If the gas industry wants to see a golden age of the industry... addressing the methane issue is critical,” Fatih Birol, executive director of the IEA, said at a panel discussion ahead of the World Gas Conference (WGC) in Washington on Monday.

“There is a huge opportunity to make the gas cleaner and the image of the gas industry much, much brighter,” Birol said in the debate with participants from ExxonMobil subsidiary XTO Energy, Cheniere Energy and green group Environmental Defense Fund (EDF).

According to Birol, as much as half of global methane emissions could be eliminated at no net cost using existing technologies, with environmental gains corresponding to two-thirds of the emissions from all of Asia’s coal-fired plants. So far, however, many companies have either preferred to spend their money where the returns come more quickly, or they simply are not aware of the opportunity, he said.

XTO president Sara Ortwein agreed with the scale of the opportunities but was less certain they are cost-free, arguing current technologies need to be improved to become more cost-efficient in halting methane leaks. “There is a vast array of potential solutions, but I do not think they are necessarily low cost, and certainly not no cost,” she cautioned.

Some may also be reluctant to invest in leakage reduction because there is not enough data to make it a sound business case, according to Birol.

The IEA’s 1.7% figure is “very uncertain”, which makes it crucial that companies take steps to collect and share their data, he said.

One effort comes from nonprofit EDF, which, after leading a study to more closely measure emissions, concluded that the US oil and gas industry is emitting nearly 60% more methane than is currently estimated by federal regulatory officials, according to a study published in the journal Science last week.

“Methane is responsible for at
Changing landscape: Fatih Birol, the executive director of the IEA, said it was now ‘critical’ that gas producers address the issue of methane emissions.

Photo: LINUS SUNDAHL-DJERF

US SUPERMAJOR ExxonMobil’s unconventional unit XTO has highlighted efforts it has already undertaken to cut methane emissions, saying those from its operations have dipped 9% over the last two years.

XTO president Sara Ortwein said the industry faces a dual challenge of “producing energy that’s going to be needed to enable development but also addressing the environmental footprint of our operations.”

The XTO reductions form part of ExxonMobil’s overall programme to reduce emissions from its worldwide operations by 15% by the end of the decade.

XTO said that it started a methane management programme last year that aims to mitigate emissions from its activities and includes a commitment to phase out high-bleed pneumatic devices over three years, extensive personnel training, research and facility design improvements for new operations.

XTO added that it has already eliminated two-thirds of existing high-bleed pneumatic devices from its US operations. The company is also looking to introduce emissions reducing technologies on new projects such as at its James Ranch facility in the Delaware basin.

least a quarter of the global warming we see right now,” EDF president Fred Krupp said.

Even if gas is eventually replaced by renewable energy in power production, two-thirds of global gas is used for other purposes, making it an urgent task to reduce methane leakage, he said.

Leaking methane is not only bad for the environment, it also represents a huge waste, as the energy that goes up in thin air each year is enough to power Africa twice over, according to Krupp.

The US study, which gathered data from 400 gas wells over six years, concluded that $2 billion-worth of US gas is lost each year.

The US is about five years ahead of the rest of the world when it comes to mapping methane leakage, but international players are starting to get to grips with the data collection issue, Krupp said.

Some of that action is spurred by government demands, as authorities in several countries and US states are starting to impose restrictions on methane emissions.

Gas companies should go ahead with low-cost leakage-reducing measures before buyers start demanding information on methane emissions, the panel agreed.

“The natural gas industry has made claims about being cleaner, but now that we understand the methane problem, it has a much bigger greenhouse gas footprint than has been understood,” said Krupp.

“Increasingly the natural gas industry is not competing against coal – it is competing against lower and lower cost renewable energy, which makes the environmental profile pretty important, he argued.”

The transition to low carbon is underway and we’re hitting the gas.

To meet the dual challenge of more energy and fewer emissions, we need to make every type of energy cleaner and better.

Natural gas is not just a cleaner alternative to coal in power generation, it’s the ideal complement to renewables as a solution to intermittency. And with our commitment to taking a leading role in addressing the methane challenge, we’re producing more natural gas as we transition to a low carbon future.

See how we’re advancing the energy transition at bp.com/energytransition
STATE-owned Qatar Petroleum (QP) has received intense interest from major oil companies keen to be involved in the planned expansion of the company’s flagship North Field that will ensure the Persian Gulf state remains the largest liquefied natural gas producer in the world.

QP’s chief executive Saad Al-Kaabi told Upstream: “All the major companies are interested in joining us to build the new trains. We are talking to them and will make a final decision once the FEED (front-end engineering and design) has been carried out.”

Kaabi expects the final investment decision to be made late next year once Japan’s Chiyoda has carried out the FEED contract for three new mega trains.

France’s Total, which already has a stake in Qatari liquefaction trains, is among those confirmed to be seeking to expand its presence by joining the new expansion.

Asked if his company will be bidding for the new trains, Total chief executive Patrick Pouyanne said: “Of course. We are working on it. Total is one of the largest partners of Qatar. We are becoming the number two in LNG production with the Engie assets in July.”

The North Field expansion project is aimed at boosting output at the giant gas field, which is shared with Iran, from 77 million tonnes per annum of LNG to 100 million tpa by 2023, ensuring that Qatar remains the world’s largest LNG exporter.

Targeted capacity under the expansion scheme is 4.6 billion cubic feet per day of gas, adding about 1 million barrels of oil equivalent per day to Qatar’s output.

State-owned LNG producer Qatargas, acting on behalf of QP, has already set the ball rolling on the upstream elements of the expansion by awarding US contractor McDermott a detailed design contract covering the offshore jackets. The offshore facilities will be integrated with the three new 7.8 million tpa liquefaction trains.

QP said in May that the design award to McDermott was “an important step” towards the awarding of a full engineering, procurement, construction and installation deal. Once a full EPCI deal is awarded, drilling is expected to go ahead next year.

ExxonMobil, ConocoPhillips, Total and Shell are currently major partners of QP in operating LNG and gas-to-liquids plants that source their gas feedstock from the North Field.

The new expansion phase will help increase Qatar’s importance to the growing global gas industry. It will also help fend off a challenge by Australia to be the world’s leading LNG exporter, and the emergence over the next decade of new players such as Mozambique.

“The expansion of Qatar’s LNG production from the North Field is an important landmark in QP’s strategic growth plan and objectives of becoming one of the best national oil and gas companies in the world,” Kaabi said earlier this year.
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INDUSTRY OVERVIEW

BP ready to put case for gas in energy transition

On the eve of WGC 2018, Upstream surveyed a number of leading figures in the international gas industry on topical issues shaping the sector. BP upstream chief executive Bernard Looney responds.

Upstream: How do you see the prospects for the gas sector over the coming decade and beyond?

Bernard Looney: I believe natural gas has a huge part to play in the future of energy. It is abundant, flexible and critical in the transition to a lower carbon economy.

Gas produces half the greenhouse gas emissions of coal when burned for power, as well as providing ideal back-up for renewables, as it can quickly be brought online when there is less sunshine or wind.

We have already seen gas replacing coal in power and emissions falling as a result in the US, UK and many other countries.

Indeed, the BP Statistical Review of World Energy shows that 2017 was a bumper year for gas globally, with a 3% rise in consumption, higher than oil or coal. Based on recent trends, we project average growth of 1.6% per year in gas demand to 2040 — more than the growth of oil and coal together.

Upstream: How big a part does the gas sector play in your business and how has that changed in recent years?

Bernard Looney: Gas plays a major part in BP’s business.

We have Upstream gas production operations around the world, including giant fields such as Shah Deniz in Azerbaijan, Tangguh in Indonesia and Khazzan in Oman. We distribute gas through pipelines and our growing liquefied natural gas business.

And we are also a major gas marketer — number one in the US. Some projects span the supply chain, such as the Southern Gas Corridor, which is due to deliver 16 billion cubic metres of natural gas each year from Shah Deniz in the Caspian Sea through 3500 kilometres of pipelines to customers in Georgia and Turkey in 2018, and in countries as far away as Greece, Bulgaria and Italy from 2020.

Another issue is that of methane emissions in production, which can limit the life-cycle environmental benefits of gas.

Upstream: Can the industry persuade public opinion that gas is part of the solution for the energy transition rather than part of the ‘fossil fuel’ problem? If so, what more should be done by the industry to try and win that argument?

Bernard Looney: Gas replacing coal in power has already helped cut emissions dramatically in countries such as the US and UK. Gas is an ideal and versatile solution needed to bring gas to customers.

Upstream: How do you see the role of gas in your business in the years ahead?

Bernard Looney: LNG will be increasingly important. LNG trade grew 10% last year, with China accounting for half of the growth in demand.

LNG can go anywhere in the world and is helping to bring a new gas market. In BP we operate liquefaction plants in Trinidad & Tobago and in Indonesia and we trade LNG worldwide. We supply LNG to China and helped build the country’s first LNG import terminal.

Upstream: Are you a producer who is concerned about the impact of pipeline delays on existing projects?

Bernard Looney: Project start-ups were gas producing ones, as will be 13 of the 22 planned out to 2022.

Upstream: What are the main challenges that the gas sector faces?

Bernard Looney: One of the biggest challenges is connecting supply to demand. The world has abundant gas resources and high demand, but not in the same places.

Where demand is soaring, but not in the same places, the challenge is to create the infrastructure needed to bring gas to customers.

Upstream: How important a role will gas play both for your company itself and the industry in general over the years ahead?

Bernard Looney: LNG will be increasingly important. LNG trade grew 10% last year, with China accounting for half of the growth in demand.

Upstream: Can you give an example of how BP is improving the energy efficiency of its upstream operations?

Bernard Looney: At Khazzan in Oman where we have a central facility instead of multiple ple wells and reducing emissions in established operations such as US onshore gas fields, where we pioneered a technique called ‘green completions’ where gas is captured instead of being vented.

We are also making advances in detecting methane emissions including using infrared cameras in combination with software.
WGC 2018 tunes up in Washington
Welcome to the 27th World Gas Conference!

I would like to take this opportunity to thank all of you, our distinguished guests, for joining us in Washington and to welcome you to the grandiose event that this 27th World Gas Conference will be.

There are several reasons making this conference and your presence here very significant.

The first reason is — it is the largest gas industry event in the world, which will give you the opportunity to engage with an immense network. The industry and our stakeholders are gathered here by the thousands from more than 90 countries, with a diverse and impactful group of energy industry leaders, government officials, policy makers, non-governmental organisations, consumers, and key members of the financial community. With more than 600 speakers in 115 sessions over the course of the week, augmented by an exhibition floor stretching six city blocks, this event is indeed massive. You will have countless opportunities to hear from government and industry leaders, to learn about the latest energy innovations, see new product demonstrations, network with your peers and perhaps even make some business deals!

I would also like to bring to your attention, that running in parallel to this conference, is the Young Professionals Program. These emerging leaders will interact directly with senior industry executives and experience a customized program, designed to educate, motivate and supercharge their development into the leaders of tomorrow’s natural gas industry.

Second, it is the most diverse and outspoken WGC to date, designed to encourage active, open debate about the most important issues faced by our industry today and to discuss the role of natural gas in a sustainable energy future. We worked very hard to come up with a well-rounded agenda that reflects most pressing and urgent global issues, but also to ensure that the most prominent thought leaders in the world are here to speak to you about these issues. As a result, you are here at a truly global event, with a truly international and cross-sectoral representation.

Third, your presence here helps to inform and strengthen the global voice of gas. The World Gas Conference is owned by the International Gas Union and takes place every three years in the host country that serves and leads the IGU as its Presidency. Since IGU’s formation in 1931, this not for profit organization has advanced the technical and economic interests of the global gas industry, while striving to provide safe, affordable energy to improve quality of life for our fellow citizens. IGU’s membership spans 91 countries, representing 97% of the world’s gas production and consumption. Its home office is located in Barcelona, Spain.

The global voice of gas has never been so crucial, as it is now, and the IGU has worked hard to make sure it is heard. We’ve gone from COP 21, where gas was an afterthought, to a promising future with strong global growth outlooks.

Global gas growth has accelerated, driven by developing countries’ needs to fuel economic opportunity and tackle the acute challenge of poor urban air quality.

China and India have embraced gas in a big way. A dynamic global LNG market has emerged with new sellers, new buyers, and new technologies that enhance access and reduce costs.

Our industry has enthusiastically embraced the challenge to reduce its environmental footprint and is working proactively to do that.

Make no mistake, this is an industry that’s on the move and positioned for long term success.

I would like to give my thanks to everyone who made this event and this organization possible. At any point in time, roughly 1000 senior energy professionals from IGU member associations and companies collaborate on working committees and taskforces to advance prospects for the global gas industry. We offer our thanks to those many IGU volunteers for their countless contributions.

There are also many sponsors who supported the preparation and conducting of this World Gas Conference. In particular, Host Partners Chevron and ExxonMobil have been with us every step of the way. Thank you all for your generosity and your collaboration.

With all of your support, our industry can thrive, and fulfill its mission to provide abundant and affordable energy to a dynamic world.

I call on you to Listen... Participate... Engage... and Challenge... And get the most out of this great gathering.

Let’s make this 27th World Gas Conference one to remember for the lasting impact we made by working together this week!

David Carroll
President, IGU
We need to show how natural gas can transform the world we live in

I t is not difficult for me to remember a time when the commonly held belief was that the United States was running out of energy resources.

In April 1977, I was serving as an Assistant Attorney General for the State of Oklahoma and preparing for a year abroad to study international economics as a graduate fellow at the University of Edinburgh. President Jimmy Carter delivered his “Address to the Nation on Proposed National Energy Policy” informing us we could not substantially increase our domestic energy production. Our energy decline dramatically changed our standing in the world and it became clear that it was going to be necessary in the coming decades to redefine American greatness. In 1979, I decided to run for the US House of Representatives.

I spent 14 years in Congress wrestling with the complicated diplomatic and national security issues that are bound up in where we get our energy and how we use it. I spent many late nights in the United States Capitol debating how we could provide affordable energy to our constituents, protect our environment and enhance our national security — priorities that to this day I feel strongly should not be mutually exclusive.

And then everything changed.

We now knew there was natural gas trapped within the layers of shale and in Oklahoma we had been hydraulically fracturing for decades. But combining this technique with horizontal drilling unlocked a supply of natural gas that is more than enough to meet America’s diverse energy needs at affordable and stable prices for a century and beyond.

The United States is both the world’s largest consumer and producer. More homes and businesses in the United States use natural gas today than ever before and the numbers continue to increase. We have boosted our economy and enhanced our national security. Greater use of natural gas and its role in supporting renewable energy has led to energy-related carbon dioxide emissions hitting 25-year lows. Choosing between affordability, environmental protection and security is a relic of a bygone era.

Which brings us to this moment.

I am excited to welcome the world’s largest global gas conference to our nation’s capital, not just because of what has transpired, but because of what lies ahead. The technology that unlocked this abundance of natural gas from beneath our feet has been shared across the globe to benefit people on every continent. The import terminals built on our coasts in years past have been turned into export facilities so that we can make our vast supplies of natural gas available to our friends and allies. Other nations have followed suit, creating a more diverse and open global natural gas marketplace that benefits consumers and our environment.

The 27th World Gas Conference is taking place at a critical time. There are necessary conversations for us to realize the full potential of this natural gas revolution. Our commitment to safety will continue. We are invited into communities and trusted to provide essential energy and we treat this solemn responsibility with the utmost care. We will continue to safely produce, transport and deliver natural gas and enhance this process to protect our customers, our communities and the men and woman who work in our industry.

This conference will feature dialogue with policymakers throughout the world. Our abundant supply has shattered old notions of energy scarcity but we must make in its place a smart framework of policies that empower us to use our natural resources effectively and efficiently. Together, we can build a future where natural gas not only provides energy for homes and businesses, but runs a significant number of our vehicles, generates power and supports renewable energy. This vision depends upon a fact-based discussion with advocates and adversaries about integrating natural gas solutions into long-term resource plans as a partner with — not to the exclusion of — other forms of energy. Working with policymakers we can enhance energy efficiency programs and help ensure that all customers have access to natural gas.

There are more than 100 innovative natural gas technologies available today that offer a significant efficiency improvement potential which can contribute to achieving near-term emissions reductions. Some of these technologies are part of the 40,000-square foot exhibition taking place here at the World Gas Conference. More research and development is necessary for continued improvement. We will continue advancing next-generation natural gas technologies and making them more accessible to consumers for greater comfort, efficiency and affordability.

We will continue advancing next-generation natural gas technologies and making them more accessible to consumers for greater comfort, efficiency and affordability.

Dave McCurdy
President & CEO
American Gas Association

Photo: LNG 17
Getting it started...
WGC 2018 conference program

THE WGC 2018 program benefits from the unrivaled expertise of more than 1000 industry specialists from around the world.

This international outreach helps to create a truly global gas event representing the entire gas value chain.

Some 600 speakers will address technical, commercial and strategic issues and opportunities facing the global gas industry through a mixture of session types including Keynote Sessions and Keynote Luncheons, Current Debates, Industry Insights and Technical & Innovation Center Sessions.

Download the WGC 2018 Event App to access full program information and speaker profiles, plus much more. Password: 27wgc2018

Keynote sessions

8:30am — 9:45am World Gas Conference 2018 Opening Ceremony (in order of appearance) Hall D
Speakers:
- David Carroll, President, International Gas Union (IGU), USA
- Rick Perry, Secretary Of Energy, US Department Of Energy, USA
- Kimberly J. Harris, Chair Of The Board Of Directors, American Gas Association (AGA), and President & CEO, Puget Sound Energy, USA
- Dave McCurdy, President & CEO, American Gas Association (AGA), USA

9:45am — 10:30am Opening Keynote: Fueling The Future Hall D
Moderator:
- Daniel Yergin, Vice Chairman, IHS Markit, USA
Panelists:
- Daren Woods, Chairman & CEO, Exxonmobil, USA
- Michael K. Wirth, Chairman & CEO, Chevron Corporation, USA

12:20pm — 1:35pm Keynote Luncheon: Natural Gas And LNG In The Future Of Global Energy Ballroom C
Sponsored by McDermott
Welcome:
- David Dickson, President & CEO, McDermott International, Inc.
Opening Remarks:
- Welcome: David Carroll, President, International Gas Union (IGU), USA
- Opening Remarks: Dr Fatih Birol, Executive Director, International Energy Agency (IEA), France

1:35pm — 2:45pm Keynote: The Role Of LNG In Shaping The Natural Gas Landscape Hall D
Moderator:
- Seung-Il Cheong, President & CEO, Korea Gas Corporation, Republic of Korea
Panelists:
- The Honourable Jim Carr, Minister Of Natural Resources, Department Of Natural Resources, Canada
- Peter Coleman, CEO & Managing Director, Woodside, Australia
- Chaiu Jokul, Chairman Of The Board, Tellurian, USA
- Jack A. Fusco, President & CEO, Cheniere Energy, Inc., USA

2:45pm — 4:10pm Keynote: The Biggest Challenges And Opportunities Facing The Global Gas Industry Hall D
Moderator:
- Senator Bill Cassidy, Louisiana, USA
Panelists:
- Parisa Ramezi, President & CEO, Qatar Petroleum, Qatar
- Bob Dudley, Group Chief Executive, BP, UK
- Patrick Pouyanne, Chairman & CEO, Total, France
- Ryan Lance, Chairman & CEO, ConocoPhillips, USA
- Tor Martin Anfinsen, Executive Vice President For Marketing, Midstream & Processing, Equinor, Norway

WGC 2018 Industry Focus — LNG

THIS is an exciting time for the LNG industry, with the US expected to become the world’s third-biggest LNG exporter by capacity in 2018. Earlier this year saw the first LNG cargo vessel leave the newly constructed Dominion Energy Cove Point LNG Terminal — one of three facilities that some delegates were lucky enough to visit yesterday on WGC 2018 Technical Tours.

LNG professionals can look forward to these sessions this week:

Today at 12:20 — Keynote Luncheon: Natural Gas & LNG In The Future Of Global Energy Welcome: David Carroll, President, International Gas Union (IGU)
Opening Remarks: David Dickson, President & CEO, McDermott International, Inc.
Speaker: Dr Fatih Birol, Executive Director, International Energy Agency
Sponsored by: McDermott

Today at 1:35 — Keynote Session: The Role Of LNG In Shaping The Natural Gas Landscape
This session will explore:
- Trends and market dynamics
- Impact of US LNG exports on global energy markets
- Impact of oil prices on LNG prices
- Future gas demand forecast for the big three — Japan, South Korea and China
- How are emerging importers reshaping the LNG market?
- Impact of FLNG and FSRUs
- Challenges created by the expansion of LNG
Dynamic Current Debate Sessions this week include:
- The Global LNG Market: Key Drivers, Challenges & Opportunities
- Emerging Business Models for a Competitive LNG Market
- What Next for the LNG Industry?
Please refer to the WGC 2018 Event App for full programme information.
Master Class Highlights

YESTERDAY Baker Botts and LNG Worldwide LTD hosted their own full day Master Classes, with the aim to provide delegates with industry specific and up to date training to further their professional growth and understanding of the gas industry.

Both courses were run by world renowned experts who shared their detailed knowledge of the key issues facing the industry today.

Special events

10:45 Official Exhibition Opening — American Gas Association (AGA) booth #2600
Official ribbon-cutting and Welcome Remarks from Assistant Secretary of Commerce for Industry Analysis, Nazak Nikakhtar and Assistant Secretary of State for Energy Resources, Frank Fannon.

4:00 ExxonMobil Power Play Event — booth #2821
The Power Play networking event is a celebration of the role that women are playing throughout the Gas to Power industry and provides an opportunity to form closer connections that can help women be even more impactful.

#WGC2018CONNECT — Pick up your networking lapel pins!

DON’T forget to pick up one (or more!) of these lapel pins from the WGC 2018 Networking Hub in the conference area, designed to represent your main area of interest.
You can use the pins as an enhanced networking tool to seek out other delegates with the same interests or areas you want to know more about. Don’t forget to #WGC2018Connect.

WGC 2018 EVENT APP

BENEFITS

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If you have not received your invitation or verification email, please email apphelp@wgc2018.com or visit the App Helpdesk onsite at the event.

FOLLOW US: Search for #WGC2018 on LinkedIn, Twitter and Facebook.
Around Washington DC — show your badge!

EVERY hotel room for the event is within walking distance of the Convention Center, numerous restaurants, and the major attractions of Washington DC, including the Smithsonian Museums, the US Capitol, the White House and the Washington Monument. Washington is one of the top tourist destinations for visitors from around the globe, and in 2015 was voted “Best City to Visit” in 2015 by Lonely Planet. There is something for everyone and many of the museums and galleries are free of charge.

We have teamed up with Destination DC to secure discounts at local attractions, restaurants and retailers for all our event attendees when you produce your conference badge! More information about the promotions available can be found on the WGC 2018 Event App.

We hope this helps you to explore the city and find local areas of interest to make sure you don’t miss out on anything DC has to offer during your stay at WGC 2018!

WGC — by the numbers

For all the latest news follow us on social media for event highlights and share your experiences and photos using #WGC2018. Search for 27th World Gas Conference (WGC 2018).

General information

FOR up to date event information please download the WGC 2018 Event App. Password: 27wgc2018

The app is an essential tool to help you navigate the event and contains the program for the week, speaker profiles, exhibition layout, networking features and much more.

For inquiries please visit the App Helpdesk near the Registration Area in the Grand Lobby or email apphelp@wgc2018.com.

For media and PR inquiries please visit the CWC and Edelman teams in the Media Center, in Salon A.

Shuttle buses are provided for delegates between all event hotels and the venue — please visit the WGC 2018 Event App or refer to the Pocket Guide for schedule information.

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Crude price falls after Opec and Russia deal

Major producers agree to increase supplies as demand concerns bite

OIL prices fell on Monday after Opec and Russia prepared to boost supplies by 1 million barrels per day to quench consumers’ thirst in an overheated market.

International benchmark Brent crude futures fell 1.4% to $74.30 per barrel in early London trading. Prices had jumped by more than 3% last week after Opec said on Friday it had voted for an increase in supplies. However, investors initially remained sceptical about whether producers would release enough extra supplies to meet demand because a number of Opec members are unable to raise their production.

However, Saudi Arabia said it was prepared to use its spare capacity to meet any shortfall and that eased concerns as the start of this week.

Powerful Saudi Oil Minister Khalid al-Falih said Opec and others will collectively add as much as 1 million bpd in the coming months, adding that state oil company Aramco was on standby to raise output by hundreds of thousands of barrels.

“We already mobilised the Aramco machinery, before coming to Vienna,” he said at the weekend.

“We will do whatever is necessary to keep the market in balance,” Falih — sitting alongside his Russian counterpart Alexander Novak at Opec headquarters in Vienna — said. Novak said Russia would add 200,000 bpd to its production in the second half of this year.

Opec and allied non-members led by Russia agreed on Saturday to raise production from July as part of a collective move to ease worries among consumers about supply shortages that have been driving up the oil market.

The deal came a day after Opec oil ministers decided during their regular meeting in Vienna to increase supplies without specifying an exact amount.

The producers, including those outside Opec, pledged to return to 100% compliance with previously agreed production cuts. That implied additional supplies because some members were producing below their quotas.

However, every producer seemed to have its own interpretation of what the planned increases meant for the market. Iran saw no more than an additional 500,000 bpd, while Nigeria predicted 700,000 bpd and Iraq said it could be as much as 800,000 bpd.

Iran’s Oil Minister Bijan Zanganeh said Saudi Arabia would not be allowed to produce more on behalf of members such as Venezuela, where output has been falling in recent months.

“Each country that has produced less (than its allocation) can produce more. Those that cannot, will not. This means that Saudi Arabia can increase its production by less than 100,000 bpd,” Zanganeh said.

However, Falih disagreed, and said pro-rata quota reallocations did not have to be strict, in a clear sign that Saudi Arabia was seeking to fill the gaps left by others.

“Some of the countries are not going to be able to produce, so the others will. And that implies there will be indirectly a reallocation,” he said.

The Saudi minister said Opec could hold an extraordinary meeting before its next scheduled assembly on 3 December or adjust output in September when its monitoring committee meets, if oil supplies fell further because of renewed US sanctions against Iran.

Opec and allied producers such as Russia have been participating in a pact since last year to curb production by 1.8 million bpd.

Their collective cuts have helped rebalance the market and lifted oil prices to around $75 a barrel, from as low as $27 in 2016. However, production disruptions in Venezuela, Libya and Angola, added to the production squeeze and tightening US sanctions on Iran, are further threatening supplies. Zanganeh said supermajor Shell and France’s Total had already cut crude purchases from Iran.

Falih warned the world could face a supply deficit of up to 1.8 million bpd in the second half of 2018 without remedial action.

Saturday’s accord, in which non-Opec countries ratified the previous day’s deal, did not mention an exact supply increase or how it should be shared among members.

This appeared to be a deliberate attempt to placate Iran and other like-minded producers who did not want to be seen as rewarding US President Donald Trump who has urged Opec to pump more oil.

Falih insisted that no individual country will be subject to a strict output cap.
INDUSTRY OUTLOOK

Gas takes centre stage as Anadarko looks to the future

On the eve of WGC 2018, Upstream surveyed a number of leading figures in the international gas industry on topical issues shaping the sector. Anadarko executive vice president, international, deep-water and exploration Mitch Ingram responds

Upstream: How do you see the prospects for the gas sector over the coming decade and beyond?
Mitch Ingram: Natural gas will continue to be a significant source of cleaner, reliable, and affordable energy for many years to come. The abundance of natural gas discovered in the US and elsewhere, for example Mozambique, will continue to make it cost competitive for consumers around the globe.
Most industry participants expect gas to become a growing part of the energy mix in many developed and emerging nations. We also expect natural gas to continue to be an important part of reducing atmospheric carbon dioxide emissions as efforts to combat global climate change attract greater commitment and focus.
Upstream: How big a part does the gas sector play in your business and how has that changed in recent years? Do you see the role of gas in your business gaining in importance over the years ahead?
Mitch Ingram: Natural gas constitutes just under a third of our total production mix. We anticipate this number staying fairly static for the next few years as the majority of our assets today are oil and liquids focused.
However, looking to the middle of the next decade when we expect the Anadarko-led Mozambique LNG project to be on-stream, subject to a final investment decision by Anadarko and the Area 1 participants, natural gas will play a larger role in line with Anadarko’s long-term cash-flow generation and value-creation strategy.
That being said, we anticipate that the majority of our LNG sales from Mozambique will nevertheless be linked to oil prices in line with project financing requirements.
Upstream: How important a role will LNG play both for your company itself and the industry in general over the years ahead?
Mitch Ingram: Starting with our company, our Mozambique LNG opportunity includes a massive resource totalling approximately 75 trillion cubic feet of recoverable natural gas in the Offshore Area 1. A resource of this scale will be a major development for Anadarko beginning with two initial trains totaling 12.88 million tonnes per annum and expanding over the years to include up to 50 million tpa. We anticipate a project of this scale operating for 30 years or more.
For the industry, most observers believe LNG market rebalancing will occur in the early 2020s and that there remains a very significant opportunity for new LNG suppliers like Anadarko-led Mozambique LNG in the post-2020 period. Periodic supply disruptions, weather-driven demand increases or, heightened geopolitical tensions remind us of the need for diversified sources of production to ensure security of supply.
Mozambique LNG represents a new source of diversified supply for the global LNG market and is centrally located with direct shipping routes to growing Asian, European and other global markets.
Upstream: What are the main challenges that the gas sector faces?
Mitch Ingram: On the surface, it would appear that climate change is the main challenge. The need to reduce carbon emissions has seen governments, especially in developed countries, push for renewable energy growth.
We see climate change as an opportunity for gas demand growth. Gas is the cleanest of all fossil fuels, while it has the supply reliability that renewable energy currently lacks, making gas complementary to renewable energy such as solar and wind.
How the gas sector rises to this challenge depends on its price and supply flexibility in navigating both the carbon needs and the energy security requirements of the new era.
We need to assure the market that there is sufficient gas to meet the clean energy needs of the 21st Century, but keep gas prices competitive.
In order to ensure that natural gas remains competitive for global customers, we are focused on reducing the costs of our LNG development in Mozambique.
We are conducting a bid refresh with our contractors, and the preliminary results look very promising.
Moreover, we anticipate sharing the costs of some common infrastructure at the Afungi plant site with Area 4 developers.
All of this will enable us to offer a competitive source of LNG to customers around the world.
Our recent marketing successes demonstrate there is a healthy appetite for LNG from Mozam-
Shell makes decision to develop Fram gas field as a subsea tie-back

SHELL has reached a final investment decision to develop the Fram gas and condensate field in the UK North Sea via a subsea tie-back to the Anglo-Dutch supermajor’s Shearwater platform.

Two wells will be drilled and the natural gas liquids they produce will be transported via a new subsea pipeline to the existing Starling field and then on to the Shearwater platform through existing pipelines,” the superna.

A previous plan to develop Fram via a floating production, storage and offloading vessel was put on hold in 2013 after unexpected results from development drilling.

The Fram field is located in blocks 28/3a, 28/4c, 28/8a and 28/9c in the central North Sea, around 221 kilometres east of Aberdeen in water depths of about 100 metres.

BHGE nets ‘substantial’ Gorgon phase two deal

BE-CONTROLLED Baker Hughes (BHGE) has confirmed the award of a “substantial” contract to supply subsea production systems and well completion equipment for US supermajor Chevron’s Gorgon phase two liquefied natural gas project in Australia.

A 15-year Master Service Order covers the subsea production system, the workscope for which includes 13 subsea production trees, two eight-slot manifolds, wellheads and specialty connectors and pipes systems, and subsea control systems and associated equipment.

BHGE is also supplying well completion equipment and services, covering coring work, liner hangers, completions and well bore clean-up technology under a five-year contract.

“The expanded Gorgon subsea infrastructure will continue to be supported out of BHGE’s state-of-the-art oil and gas campus in Andakor, Western Australia,” said Visal Leng, BHGE president for Asia Pacific.

Looking ahead: Anadarko executive vice president, inte

Mitch Ingram: What is your company currently doing to control emissions and what more do you plan to do?

Mitch Ingram: We have been a leader for a number of years in reducing emissions throughout our operating areas. Some examples include:

100% of our facilities are subject to voluntary, state or federal fugitive component leak monitoring through AVO or FLIR camera inspection methodologies, on a monthly to annual basis.

Broad usage of FLIR camera technology for performing leak monitoring and identifying repairs during the commissioning of facilities and equipment.

Installation of plunger lift, submersible pumps, and gas recovery system to reduce vented methane.

Reduced emission completions at all natural gas and oil wells.

Solar-powered pumps to replace gas-fired pneumatic pumps.

Use of natural gas and low-emission diesel to power well pad operations.

Use of “Bi-Fuel” or “dual fuel” frac pumps that replace up to 70% of the diesel fuel used to power completion equipment with LNG.

Currently running nearly 450 vehicles (approximately 20% of the fleet) across our US operating areas to natural gas vehicles.

Commitment to the replacement of high bleed controllers with low-bleed or no-bleed controllers at existing facilities.

Replacement of dated and less-efficient compressors.

Increased usage of pipelines and water-management programmes that eliminate truck traffic and their associated emissions.
ENERGY TRANSITION

Oil and gas sector gets set for change to energy mix

DNV GL survey reveals senior industry professionals believe gas will play important role over next decade

ANAMARIA DEDULEASA
Washington, DC

The oil and gas industry is getting ready for the shift to a lower-carbon energy mix as investments in natural gas projects increase and gas prepares to eventually trump oil and become the world’s primary energy source, according to a recent survey.

Consultancy and certification group DNV GL surveyed 813 senior industry professionals to find that the vast majority (86%) of them agree that gas will play “an increasingly important role in the global energy mix over the next decade”.

This compares to 77% of the senior industry professionals surveyed last year by DNV GL in its annual Energy Transition Outlook.

According to DNV GL, the global energy transition is becoming a primary driver for investment in natural gas and liquefied natural gas projects and that was highlighted by more executives this year.

As a result, nearly two-thirds (64%) of oil and gas sector leaders expect to increase or sustain spending on gas projects in 2018.

Investments are expected to continue their growth as the sector prepares for gas to “overtake oil as the world’s primary energy source in the mid-2030s”, DNV GL said.

However, the survey revealed that the pace of the industry’s intentions to lower carbon emissions differs by region, with only a third (33%) of survey respondents in North America (33%) actively preparing for a shift to a lower carbon energy mix this year, compared to more than half (51%) in the Middle East and North Africa.

DNV GL predicts the industry’s intentions to increase gas investments will accelerate in the early-2020s as major oil companies decarbonise their business portfolios, with gas demand expected to peak in the mid-2030s. The outlook suggests North East Eurasia and the Middle East and North Africa will increase gas output until 2040 at least, overtaking North America as the world’s largest gas producer.

Production is also forecast to double in China, the Indian subcontinent and South East Asia, according to the research.

Power generation is predicted to be the main consumer of gas in most regions, though manufacturing could demand similar volumes in emerging markets.

“Significant investment will be needed in the gas industry over the coming decades to increase capacity, transform assets to source and transport a decarbonised mix of energies, and to safely build and maintain the infrastructure needed to connect emerging supply regions with evolving demand centres,” said DNV GL Oil & Gas chief executive Liv Hovem.

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AUSTRALIA will not see any gas supply shortfall before 2030 as concerted efforts by industry and the government have helped to reduce the risk of a shortfall that was earlier projected for next year, according to a report from the Australian Energy Market Operator (AEMO).

However, achieving the required gas supply security throughout the next decade will require fresh investment in exploration and production ventures, according to The Australian Petroleum Production & Exploration Association (APPEA).

“This means there is no room for complacency... meeting demand over the period to 2030 will still require on-going industry investment in commercialising existing reserves and resources and finding new sources of supply,” said APPEA chief executive Malcolm Roberts.

He noted that with exploration activity at historically low levels, it was vital for Australia’s relevant state governments to support developing new gas supplies as quickly and as cheaply as possible.

Roberts said this would require a focus on reducing bureaucracy and regulatory burdens in New South Wales and “urgently” removing bans and moratoria in Victoria, which remain barriers to increasing Australia’s energy security and put downward pressure on prices.

“It is now time to shift the focus back to where it belongs — the need to ensure more gas supply and more gas suppliers,” he argued.

The AEMO’s 2018 Gas Statement of Opportunities (GSOO), which has a 20-year outlook, predicts Australian gas consumption in 2019 will be 35 petajoules less than its September 2017 estimate and some 61 petajoules less in 2022 versus the 2016 National Gas Forecasting Report (NGFR).

However, an improved outlook stems from revised assumptions about efficiency rates of liquefaction and increased debottlenecking to lift total export capacity, said the AEMO.

The key trends of its LNG forecast are a slow increase from 2019 to 2023 to meet global demand and exports to ramp up beyond 2023 to maximum production capacity, largely driven by stronger LNG demand in Asia.

Factors including fuel switching to help reduce greenhouse gas emissions, the further development of international carbon markets and the mandatory reduction of sulphur emissions from marine vessels are expected to contribute to this burgeoning Asian demand for LNG.

However, even with this increased demand, there will be no shortfall in domestic gas supply before 2030, according to the AEMO.

APPEA said that the GSOO confirmed the actions taken by the industry to bring more gas into the domestic market had removed concerns about potential shortfalls.

“With the revised forecast projection, there have been a significant number of new gas supply agreements announced in 2017 and 2018 providing gas to domestic customers,” added Roberts.

The gas industry has announced billions of dollars in new investment in 2018 and beyond, to bring more gas into the market, supporting both domestic gas consumption and the gas supply projects that are underpinning much of Australia’s economic growth.

However, analyst Wood MacKenzie responded to the AEMO’s latest forecast by warning that its own East Coast report identified a potential gas shortfall between 2023 and 2025, considerably earlier than the GSOO’s estimate.

“While the revised demand forecast from AEMO, based on its supply modelling, we still see a gas shortfall starting between 2023 and 2025. This is significantly earlier than 2030, which is what the 2018 GSOO indicates,” said Nicholas Browne, WoodMac’s head of Asia Pacific Gas & LNG.

Browne said that there are two immediate options to meet this predicted shortfall — LNG imports and diverting coal seam gas from Queensland to east coast customers, although the cost for these consumers would be expected to increase.

“As the higher quality CSG areas, such as the Undulla Nose and the Comet Ridge are more fully developed, we expect supply to increasingly come from the more economically marginal areas. The AEMO said its 2018 GSOO released on 22 June came after an eventful year for gas both in Australia and globally.

“The eastern and southeastern Australian gas markets have been irrevocably changed by LNG exports and the subsequent coupling of the Australian gas market to international markets. The scale of gas used for export has led to a tightening of domestic supply,” said the AEMO.

“One of the major changes for the Australian gas industry in 2017 was the federal government’s introduction of the Australian Domestic Gas Security Mechanism, under which the Federal Minister for Resources can determine whether export restrictions should be imposed to avoid any potential shortfall in meeting domestic demand for gas.”

The AEMO added that domestic gas supply in eastern and southeastern Australia would also be enhanced by connection to the Northern Territory gas fields through the Northern Gas Pipeline that is due for completion by the end of the year.

However, from 2030 additional gas supply infrastructure will be needed to deliver gas to southern customers, unless early investment in upstream projects brings highly uncertain — and as yet undiscovered — southern prospective resources to the market.

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PRIVATE US contracting giant Bechtel has been awarded an engineering, procurement, construction and commissioning contract for the proposed Port Arthur liquefied natural gas export facility in Texas.

The decision moves the project, being jointly developed by US natural gas company Sempra and Australia’s Woodside, closer to becoming a reality as global demand for LNG continues to grow. The value of the contract was not disclosed.

The planned project envisages two natural gas liquefaction trains with total capacity of 11 million tonnes per annum, feed gas pre-treatment facilities, natural gas liquids and refrigerant storage, up to three LNG storage tanks, two marine berths and associated facilities.

“The project also includes two pipelines — one 34-mile (54 kilometre), 2 billion cubic feet per day connector, and a 131-mile (210 kilometre), 2 Bcfd line. We are confident Bechtel’s construction and management team will help us achieve a world-class LNG export project at Port Arthur and meet the global demand for LNG,” Sempra LNG and Midstream president Octavio Simoes said.

The developers expect to receive a decision from federal regulators on the facility by the middle of this year. A final investment decision is expected next year, with first LNG anticipated in 2023.

Last year, the Port Arthur LNG developers signed a memorandum of understanding with South Korea’s Kogas to provide a framework for cooperation and joint discussion regarding engineering and construction at Port Arthur, as well as operations and maintenance activities, feed gas sourcing and offtake of LNG.

Marketplace: Sempra is also developing the Cameron LNG export facility in Louisiana

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In demand: the Deepwater Invictus is set to drill for BHP off Trinidad

**CARIBBEAN**

**BHP spuds Trinidad wildcat**

**Australian operator gets exploration well under way at Victoria prospect**

GARETH CHETWYND
Rio de Janeiro

AUSTRALIAN operator BHP has started drilling a fresh exploration well on the Victoria prospect off Trinidad & Tobago, the first of three commitment wells it has planned for the second half of this year.

The well is being drilled by the drillship Transocean Deepwater Invictus, which was taken back by BHP's Trinidad unit after working in Gulf of Mexico.

BHP has acquired an ambitious amount of acreage in Trinidad's offshore play, but a 2016 drilling campaign produced inconclusive results. The Victoria-1 well is located in Block 5.

The company was originally hoping to find oil on what is a relatively deep-water play, but announced the LeClerc discovery as a Miocene-aged natural gas find last year.

LeClerc is located 190 kilometres off Trinidad's east coast with little existing infrastructure in the area.

BHP and partner Shell have signalled their intention to drill appraisal wells on LeClerc but will first pursue follow-on potential by drilling Victoria and another prospect, Concepcion.

Proving up a commercial gas play would be good news for Trinidad & Tobago where there are supply concerns given strong demand from the domestic and from the 15 million tonnes per annum Atlantic liquefied natural gas export project.

"We see a significant demand for gas - for LNG - coming in the 2020s, both from a global perspective and also from a perspective in Trinidad, be that from both the local petchem (petrochemical industry), and from an Atlantic LNG perspective," BHP vice president for global exploration Niall McCormack told Upstream earlier this year.

"So we see that there's a nice fit in terms of the timeframe of development of deep-water gas opportunities," he added.

Trinidad has seen new projects come on stream over the past couple of years through BP's Juniper and Trinidad Oshorne Compression project, while the same operator is also moving forward with its Angelin development, which is expected online next year.

However, despite such developments and other yet-to-be-developed discoveries, Trinidad is still seen as needing more gas to help alleviate shortfalls after production began to turn lower from some mature fields during this decade.

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THE global natural gas market is forecast to pass 4 trillion cubic metres per annum by 2022, with an expected average annual growth rate of 1.6% throughout the forecast period to 2023, according to the latest International Energy Agency (IEA) Gas 2018 report, released this week.

"However, there are several challenges and risks — including pricing and competing fuels — on the path to sustained growth," said the IEA’s senior natural gas analyst, Jean-Baptiste Dubreuil.

Emerging Asian markets, led by China, will account for more than half of the growth in global natural gas consumption to 2023, while the US will be the second-largest individual contributor to such demand growth after China.

"Shale gas from the Appalachian (dry gas) and Permian (mainly associated gas) basins are the main pillars of US gas production outlook given a boost by tight oil production and the phasing out of the Groningen field [in the Netherlands], calling for additional LNG and pipeline imports to bridge the gap," added the agency.

The IEA said the LNG market could start to tighten by 2023 after a period of ample supply even though some 140 Bcm of liquefaction capacity is expected to be added over the next five years, boosting global capacity by almost 30%.

"More than half of that expansion (over 80 Bcm) takes place in the US. Australia and Russia also provide significant contributions with 30 Bcm and 15 Bcm respectively that will collectively boost annual LNG trade upwards of 500 Bcm by 2023."

"In comparison, pipeline expansion is more limited, happening mainly in North America (US to Mexico) and from Eurasia to Europe and China," the report said.

Dubreuil said investment in new liquefaction capacity would also be required across the gas associated with tight oil output.

US natural gas production last year recovered — up by 3% after declining in 2016 — and shale gas currently accounts for two-thirds of total output.

Shale gas from the Appalachian (dry gas) and Permian (mainly associated gas) basins are the main pillars of US gas production outlook given a boost by tight oil production and the phasing out of the Groningen field [in the Netherlands], calling for additional LNG and pipeline imports to bridge the gap," added the agency.

"As domestic production cannot keep pace, China becomes the world’s largest natural gas importer by 2019 and with 171 Bcm of imports by 2023, is mostly supplied by LNG," said the agency.

China’s demand is forecast to grow at an average 8% per annum over the next five years, accounting for over a third of global growth demand increase, and the share of imports in the country’s supply is forecast to rise from 39% to 45% through 2023.

"Other emerging Asian economies will increase their natural gas consumption for industry (including fertilisers and petrochemicals) and power generation, and develop their domestic markets and infrastructure to import more LNG," said the IEA.

The third transformation expected by the IEA is that, compared with the previous decade, the industrial sector will take the lead from power generation as the main driver of global growth in demand for natural gas.

Emerging markets, primarily in Asia, will account for the bulk of this increase, with uses as a fuel for industrial processes as well as for feedstock for chemicals and fertilisers.

"Industrial gas demand also grows in major producing regions, such as North America and the Middle East, to support expansion of their petrochemicals sectors," said the IEA.

"The rebound in natural gas availability and use in Egypt plays a large part in the increase in consumption in Africa, while Latin American markets are reforming to develop the role of domestic production. However, consumption in Eurasia is forecast to slightly decrease due to sluggish economic growth. Meanwhile, gas demand in mature net importing markets such as Europe, Japan and South Korea is expected to stagnate."

"The US will be the second-largest gas consuming country to 2023, while Russia remains a large exporter of natural gas, and the top LNG exporter. Russia’s share of global LNG trade is on track to rise from 20% in the first half of 2018 to 24% in 2023."

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"The IEA’s Gas 2018 report forecasts global market to pass 4 Tcm per annum by 2022.

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