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THE 20TH INTERNATIONAL CONFERENCE & EXHIBITION ON LIQUEFIED NATURAL GAS

LNG2023

10-13 JULY 2023, VANCOUVER, CANADA

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INCOMING HOST قطر للطاقة QatarEnergy



Gas will be needed "indefinitely": al-Kaabi

P. 12 CANADA NEEDS LNG "AT SCALE"

P. 17 THE PATHWAY TO ELIMINATING METHANE EMISSIONS

P. 19 TECH INTEGRATION IS AT THE HEART OF THE ENERGY TRANSITION: SIEMENS

P. 23 IMPORTANCE OF ESG CITED IN ACCESS TO LNG CAPITAL

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Exhibition Level.



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Event overview



We trust that yesterday was another exceptional day, filled with enlightening discussions, valuable connections, and memorable experiences. Your enthusiasm and engagement have been truly inspiring.

As we embark on Day 3, we have an extraordinary line-up of events in store for you today. Prepare to delve into thought-provoking panels led by industry experts on the growth of LNG through innovative partnerships and cooperation, the technological advancement in this continuous evolving sector and how to increase LNG's sustainability compared with alternative energy sources. Don't miss your chance to explore cutting-edge technologies at the exhibition and engage in fruitful networking sessions. Be prepared for new insights, exciting opportunities, and a day that promises to be nothing short of extraordinary at LNG2023.

Discover. Connect. Do Business.

LNG2023 EVENT APP

To ensure you don't miss out on any of the benefits and features of LNG2023, download the App now!

Navigate the event and view the latest programme, speaker profiles, all papers and posters, exhibition layout, exhibiting company profiles, networking functions details and so much more. Also use the official LNG2023 App to chat and schedule meetings with fellow attendees and industry experts.



Download on the App Store

GET IT ON Google Play

HOW TO DOWNLOAD

Download the Cvent app to your phone from Play Store or App Store or use the QR codes below:

HOW TO LOG IN:

1. Open Cvent app and search for ''LNG2023'' event
2. Log in using your first name, last name and email address you used to register for the show.
3. To verify your account, you will need to enter a code sent to your email (please check your SPAM folder) or mobile.

ONCE LOGGED IN

Depending on your registration type you will have access to different features e.g. floor plans, full programme, speaker bios, exhibitor list as well as creating your own personalised schedule for the show.

APP FEATURES AVAILABLE TO ALL ATTENDEES:

- Event information
- LNG2023 Daily News

APP BENEFITS FOR CONFERENCE DELEGATES

- View attendee list
- Message fellow attendees
- Schedule meetings
- Manage your schedule
- View speaker profiles, papers and posters

APP HELPDESK

If you require help or advice with regards to the App, please speak to our staff at the App Helpdesk located at the main event registration on West Level 1, City Foyer – West Building or email info@lng2023.org

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Wednesday's programme highlights



Leadership dialogue with Madam Li Yalan President International Gas Union

Don't miss the first session of the day with Madam Li Yalan, President of the International Gas Union (IGU). Join now and gain insights on the IGU:
Date: Wednesday 12 July 2023
Time: 09:00 – 09:15
Location: East Exhibition Hall A

Plenary session on growth of LNG through innovative partnerships and cooperation

Join Robert Johnston, Executive Director of Columbia Center for Global Energy Policy, Paul Marsden, President of Energy – Bechtel Energy, Inc., The Honourable Stuart Young, Minister of Energy & Energy Industries of Trinidad & Tobago, Fran□ois Poirier, President and CEO of TC Energy and Cederic Cremers, Executive Vice President of LNG of Shell on the how they are developing multi-stakeholder strategic partnerships to ensure the continued growth of the LNG industry.

Discuss projects that create and sustain employment, improve productivity and competitiveness, and benefit consumers who are seeking a cleaner source of energy in the long term and what are the opportunities for creating innovative partnerships and effective cooperation going forward.
Date: Wednesday 12 July 2023
Time: 09:15 – 10:15
Location: East Exhibition Hall A

The IGU's world LNG report 2023

Don't forget to join the International Gas Union (IGU) today at 14.30 where they will unveil the highly anticipated World LNG Report 2023 in today's Presentation of the IGU's World LNG Report 2023 Spotlight Session.
Time: 14.30 – 14.30
Location: West Level 1, Rooms 121-122 l Summer Sessions
For the latest IGU's reports, please visit www.igu.org

The exhibition floor

Join Woodfibre LNG and Siemens Energy at 10:30 a.m. at stand B401 for a short presentation on how e-drive technology is powering net zero emissions for the Woodfibre LNG Project. Siemens Energy will present a model of one of the main refrigeration compressor trains that will be used at the facility.
Woodfibre LNG is one of the first LNG facilities in Canada to commit to being powered by electric drives, using renewable hydroelectricity to power the main liquefaction process - this will result in 14 times fewer stationary combustion emissions compared to a conventional LNG facility powered by natural gas.

LNG2023 welcome with QatarEnergy

Get a sneak peek at what's to come at LNG2026! Don't forget to join QatarEnergy at this afternoon's reception and enjoy traditional Qatari delicacies and entertainment while you are transported to the Souq Waqif in Doha thanks to our next host.
Time: 17.45 – 18.15
Location: West Level 1, Ballroom Foyer
Sponsored by:

قطر للطاقة
QatarEnergy

LNG2023 networking reception

Enjoy your final networking opportunity at LNG2023. Make the most of this platform to expand your professional network, establish valuable connections and strengthen existing ones whilst reflecting on the achievements of the week.
Time: 18:15 - 19:15
Location: West Level 1, Ballroom Foyer

For the full programme, remember to download the LNG2023 Event App and manage your programme schedule through the app.

Programme at a Glance

SUNDAY
9 JULY

07:00 - 16:30
REGISTRATION

14:00 - 17:30
Training Sessions

17:30 - 19:00
Arrival Cocktails
West Level 2, Ocean Foyer and Terrace

LNG2023 VANCOUVER 10-13 JULY

LEGEND

- **Plenary, Leadership Dialogue, Keynotes, Ceremonies**
  East Exhibition Hall A
- **Registration**
  West Level 1
- **Training Sessions**
  West Level 3
- **Networking Break / Lunch**
  East Ballroom A & B
  West Level 1 & 2
- **Functions**
  Arrival Cocktails
  West Level 2,
  Ocean Foyer and Terrace
  Welcome Reception
  East Exhibition Hall A
  LNG2026 Welcome with QatarEnergy
  West Level 1, Ballroom Foyer
  LNG2023 Networking Reception
  West Level 1, Ballroom Foyer
- **Spring Sessions**
  West Level 1, Rooms 118-120
- **Summer Sessions**
  West Level 1, Rooms 121-122
- **Autumn Sessions**
  West Level 2, Rooms 211-214
- **Winter Sessions**
  West Level 2, Rooms 220-222

MONDAY
10 JULY

07:00 - 16:30
REGISTRATION

09:30
Exhibition Open

09:30 - 10:00
Networking Break

10:00 - 11:00
Opening Ceremony

11:00 - 11:15
LD.01 Leadership Dialogue with Jason Klein, CEO - LNG Canada

11:15 - 12:15
PL.01
The Effect of Geopolitical Risk and Market Volatility on LNG Commercial Activity

12:15 - 13:30
Networking Lunch

13:30 - 14:30
Spotlight Sessions
SL.03 Measuring Up...
SL.01 Financing the Next...
SL.02 Role in Europe's...
SL.04 Innovation in LNG...

14:30 - 15:00
Networking Break

15:00 - 16:30
Paper Presentations
PP.03 Liquefaction...
PP.01 Commercial Trends...
PP.02 Current Dynamics...
PP.04 Innovations in LNG..

17:30
Exhibition Close

18:00 - 19:30
Welcome Reception

TUESDAY
11 JULY

07:00 - 16:30
REGISTRATION

07:30 - 08.00
Networking Break

08:00 - 09:15
PP.05 FLNG and LNG...

09:30
Exhibition Open

09:30 - 09:45
Keynote Address

09:45 - 10:00
LD.02 Leadership Dialogue with H.E. Minister of Energy, Qatar; President and CEO, QatarEnergy

10:00 - 11:00
PL.02
Challenges of a Turbulent Energy Transition

11:00 - 11:30
Networking Break

11:30 - 12:30
PL.03
LNG's Role in the Energy Trilemma

12:30 - 13:45
Networking Lunch

13:45 - 14:45
Spotlight Sessions
SL.06 Natural Gas...
SL.08 The Regulatory...
SL.07 Reconciliation...
SL.05 Forecast & Appetite...

14:45 - 15:15
Networking Break

15:15 - 16:45
Paper Presentations and Forums
F.02 Repurposing LNG...
F.03 Advances in Safe...
F.01 Global LNG Trade...
PP.06 Canadian LNG:..

16:45 - 17:45
Discovery Hub Live

17:30
Exhibition Close

WEDNESDAY
12 JULY

07:30 - 16:30
REGISTRATION

08:30 - 09:00
Networking Break

09:30
Exhibition Open

09:00 - 09:15
LD.03 Leadership Dialogue with Madam Li Yalan, President, International Gas Union

09:15 - 10:15
PL.04
Growth of LNG through Innovative Partnerships and Cooperation

10:15 - 11:15
PL.05
Fuelling the LNG Innovation Agenda

11:15 - 11:45
Networking Break

11:45 - 13:15
Paper Presentations and Forums
PP.09 Solutions for...
PP.08 Advances in LNG...
F.04 Decarbonisatio...
PP.07 Digital Twin Case...

13:15 - 14:30
Networking Lunch

14:30 - 15:30
Spotlight Sessions
SL.10 Interrelationship...
SL.09 Presentation of...
SL.11 Enabling...
SL.12 Increasing...

15:30 - 16:00
Networking Break

16:00 - 17:30
Paper Presentations
PP.13 Challenges of...
PP.11 Regional Reports...
PP.12 Import Terminal...
PP.10 Best Practices...

17:30
Exhibition Close

17:45 - 18:15
LNG2026 Welcome with QatarEnergy

18:15 - 19:15
LNG2023 Networking Reception

THURSDAY
13 JULY

07:30 - 15:00
REGISTRATION

07:30 - 08.00
Networking Break

08:00 - 09:15
PP.14
Innovation in Liquefaction...
PP.15
Development in LNG...

09:30
Exhibition Open

09:15 - 10:15
Spotlight Sessions
SL.16 Small and Micro...
SL.13 The Role of LNG...
SL.15 Market and...
SL.14 Progress in...

10:15 - 10:45
Networking Break

10:45 - 12:15
Paper Presentations and Forums
PP.18 New Approaches...
PP.16 Measuring and...
F.05 Evolution...
PP.17 Downstream...

12:15 - 13:15
PL.06
LNG2023 Conclusions and Looking Towards LNG2026

13:15 - 13:45
Closing Ceremony

13:45 - 14:45
Networking Lunch
Lunchbox Collection

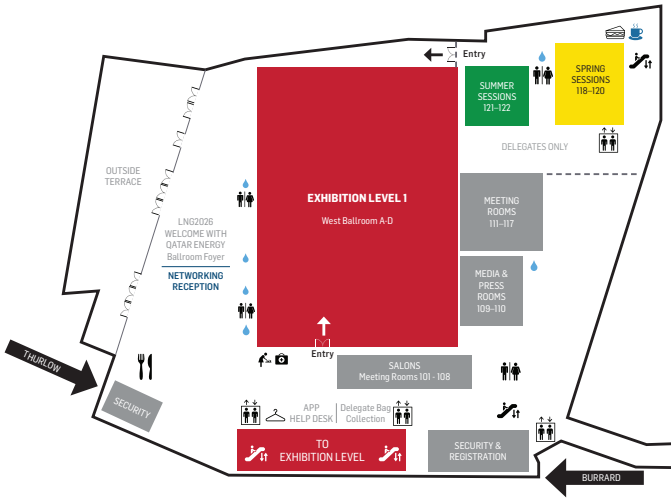
14:00
Exhibition Close

For the full programme, remember to download the LNG2023 Event App and manage your programme schedule through the app.

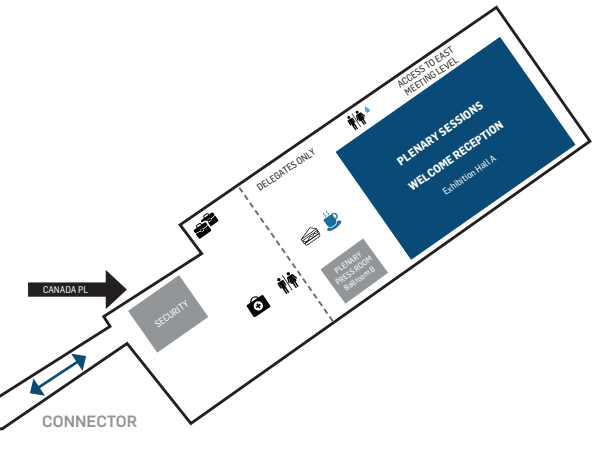
LNG2023 floorplan

LEGEND:

- **Water Fountains** — SPONSORED BY TELLURIAN
- **Bistro**
- **Conference Delegate Networking Break** — SPONSORED BY SEMPRA INFRASTRUCTURE
- **Conference Delegate Networking Lunch**
- **Cloakroom**
- **Luggage Room** Open Thursday, 13 July only
- **Male & Female Prayer Room**
- **Charging Station**
- **Mothers Room**
- **First Aid**
- **Toilet**
- **Lift**
- **Escalator**



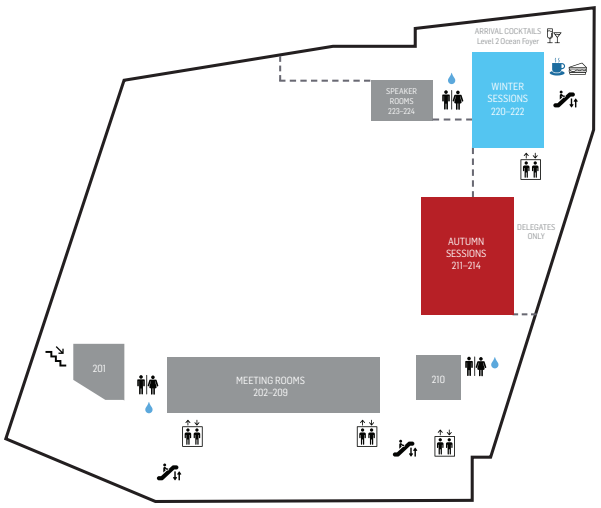
WEST LEVEL 1



EAST LEVEL 1



WEST EXHIBITION LEVEL



WEST LEVEL 2

Tuesday's highlights

Relive yesterday's excitement at #LNG2023 from the in-person sessions, the world-class exhibition and the numerous networking opportunities at the Vancouver Convention Centre.













Tomorrow's highlights

LNG2023 I Keynote Address

Honorable Danielle Smith, Premier of Alberta and Minister of Intergovernmental Relations for the Government of Alberta, is poised to deliver a highly anticipated keynote session at LNG2023. As a key figure in Alberta's government, Premier Smith's insights on the role of LNG in the province's energy strategy will be of immense interest to industry professionals and conference attendees.

Date: Thursday 13 July 2023
Time: 12.15 - 12.30
Venue: East Exhbition Hall A



LNG2023 CONCLUSIONS AND LOOKING TOWARDS LNG2026

Join us and reflect on the course of the last three conference days. A plenary session not to miss where the panel will provide critical insight into the discussions and answer your impending questions on:

- What is the state of technological advancements in the LNG sector?
- What are the challenges of the turbulent energy transition?
- What is the role of LNG in enhancing global energy security?
- What are the conditions, and where will the financing come from to expand the LNG business?
- How does LNG support climate change ambitions and how is geopolitics shaping the LNG market?

Date: Thursday 13 July 2023
Time: 12.30 – 13.30
Location: East Exhibition Hall A



LNG2023 CLOSING CEREMONY

The highly anticipated LNG2023 Closing Ceremony will take place tomorrow. Marking the end of an exceptional week of industry-leading discussions, cutting-edge innovations, and global networking. As the event draws to a close, it prepares to handover to the next host – Qatar, where a new era of LNG advancements awaits at LNG2026.

Time: 13.15 – 13.45
Location: East Exhibition Hall A



Around Vancouver



If you're seeking cultural experiences after a long day at the conference and exhibition, there are several cultural attractions you can explore to immerse yourself in the city's vibrant arts and heritage scene. Here are some cultural attractions to consider:

1. BILL REID GALLERY OF NORTHWEST
Coast Art: Dedicated to the works of the acclaimed Haida artist Bill Reid, this gallery showcases Indigenous art from the Northwest Coast. Explore the collection of sculptures, jewellery, prints, and other artworks that celebrate the rich cultural traditions of the region.

2. MUSEUM OF VANCOUVER:
The Museum of Vancouver offers a fascinating glimpse into the history and culture of the city. Through engaging exhibits and artifacts, you can learn about Vancouver's past, from its Indigenous roots to its multicultural present.

3. DR. SUN YAT-SEN CLASSICAL CHINESE GARDEN:
Step into this traditional Chinese garden in the heart of Vancouver's Chinatown. The garden is a peaceful retreat that reflects the harmony of nature and architecture. Take a guided tour or simply wander through the serene pathways, pavilions, and ponds.

4. VANCOUVER MARITIME MUSEUM:
If you're interested in maritime history, visit the Vancouver Maritime Museum. It explores the maritime heritage of the Pacific Northwest, featuring exhibits on naval history, shipbuilding, and marine exploration. Don't miss the chance to board the historic St. Roch, a famous Arctic exploration vessel.

Remember to check the opening hours and any specific guidelines or reservations required for each attraction before visiting. Vancouver's cultural scene offers a diverse range of experiences that can enrich your post-conference stay in the city.

5. CONTEMPORARY ART GALLERY:
This gallery focuses on contemporary art and presents innovative works by local and international artists. It offers a platform for emerging artists and hosts exhibitions, performances, and public programs that engage with contemporary art practices.

6. THE ORPHEUM:
Built in 1927, the Orpheum is a historic theatre known for its stunning architecture. Experience the grandeur of the beautifully restored theatre while enjoying world-class performances such as ballet, operas and other cultural events.

7. VANCOUVER PLAYHOUSE:
Located in the heart of downtown, the Vancouver Playhouse is a renowned venue for theatrical performances, including dramas, comedies, and experimental works.

8. THE ARTS CLUB THEATRE COMPANY:
This professional theatre company operates three venues in Vancouver: the Stanley Industrial Alliance Stage, the Granville Island Stage, and the Goldcorp Stage. They offer a diverse line-up of musicals, award-winning drama, hilarious comedy and so much more.

General information

HOUSEKEEPING
At LNG2023, we are committed to making it an enjoyable experience throughout this week and please find below a few useful housekeeping guidelines:

ACCESS TO THE CONFERENCE AND EXHIBITION
Every time an attendee enters LNG2023 they will be asked to present government issued photo ID at security. This can be in the form of a passport (all nationalities), or driver's license (Canada and United States only).
All attendees, including accompanying persons, are required to wear their badge AT ALL TIMES during LNG2023 - this includes social functions. Attendees will only be able to access the areas of the event relevant to their participation as shown on their badge.

DRESS CODE
Business attire is requested for attendance at the conference, exhibition, technical tours and all networking functions.

DOWNLOAD THE APP
The app is an essential tool to help you navigate the event and contains the programme for the week, speaker profiles, exhibition layout, networking features and much more. For any questions on the Event App, our staff at the App Helpdesk would be delighted to assist you. LNG2023 App Helpdesk will be situated at the main event registration located on West Level 1, City Foyer – West Building or email info@lng2023.org

CONFERENCE REFRESHMENTS
Morning tea, lunch and afternoon tea are provided to all conference delegates. Please see the times and locations in the pocket programme or the LNG2023 Event App. All conference delegates are reminded to wear their badge to access these areas.

Bistros are open in both exhibition levels for food and beverage purchases for exhibitors and trade delegates. Café 185, located just up from the main registration will also be open for paid purchases.
All Networking Coffee Breaks are sponsored by:

SEMPRA INFRASTRUCTURE

CHARGING STATION
A Charging Lounge is located at Stand 141 in the Exhibition Level Hall.

PRAYERS ROOMS
Both male and female prayer rooms are located in West Exhibition Hall C. Please refer to Directional Signage for further details.

MOTHERS ROOMS
A peaceful and private Mothers Room is located on West Level 1, City Foyer. Please refer to Directional Signage for further details.

WATER STATIONS
Thanks to our Global Sponsor, Tellurian, all conference delegates have been supplied with water bottles which can be filled up at multiple points across the East and West buildings of the VCC. Please see the floorplan for locations.

TELLURIAN

PHOTOGRAPHY
The organisers of LNG have professional photographers taking photos throughout the event. These images may be used in post-event reports, case studies, marketing collateral and supplied to industry media. If you do not want your photo to be taken, please advise the photographer.

MEDIA CENTRES AND PRESS ROOMS
Brought to you by our Global Sponsor, Tellurian, we will have dedicated Media Centres and Press Rooms at the following locations:

West Building – Room 109 Level 1
West Building – Room 110 Level 1
East Building – Ballroom B
Convention Level

For media and PR inquiries please visit the Media Team at the Media Centre or you contact the team at media@lng2023.org

TELLURIAN

EMERGENCY PROCEDURES
In case of emergency, please follow the instructions given to you by security and venue staff.

MEDICAL SUPPORT
First Aid is located on West Level 1 at the entrance of the Exhibition space opposite registration and in the East Building Lobby on convention level.

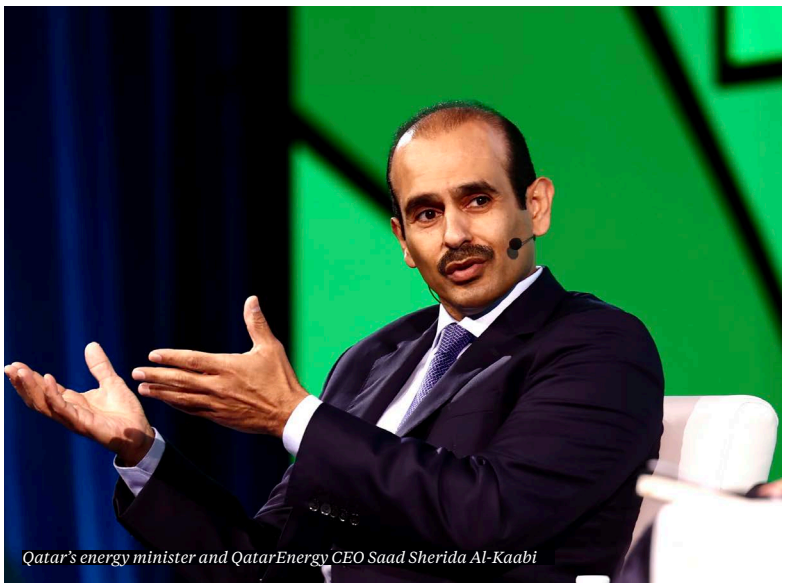
LUGGAGE ROOM
A Luggage Room will be open outside Ballroom A in the East Convention Level on Thursday, 13 July for conference delegates leaving Vancouver directly after the conference.
It will be operational between 07:30 and 15:00.

SOCIAL MEDIA
ClubLNG **ClubLNG** **ClubLNG**
Connect with us on social media to stay up to date with all event highlights and to share your own LNG2023 experiences.
Event Hashtag: #LNG2023

WI-FI
Wi-Fi is available to conference delegates in all LNG2023 hosted spaces at the Vancouver Convention Centre.

SSID: LNG2023
Password: LNG2023#BC

Gas is needed "indefinitely" : al-Kaabi



Qatar's energy minister and QatarEnergy CEO Saad Sherida Al-Kaabi

Joseph Murphy

Natural gas will be needed "indefinitely" as a guarantor of baseload energy supply, even as the capacity of renewables continues to grow over the coming years, Qatar's energy minister and QatarEnergy CEO Saad Sherida Al-Kaabi said in a keynote address on Tuesday.

"Gas is absolutely needed, as the cleanest fossil fuel, as a baseload supplier of electricity, and for powering all kinds of factories and manufacturing," he said. "Some people say that by 2050, we will need no more gas. I think we will need gas indefinitely as a baseload."

Qatar, the world's biggest LNG exporter in 2022, took a final investment decision (FID) in February 2021 on the $29bn North Field East (NFE) expansion project, due to raise Qatar's liquefaction capacity from the current 77mn tonnes/year to 110mn tonnes/year by the middle of the decade. It is currently preparing to greenlight North Field South, which will increase capacity even further to 127mn tonnes/year.

"There were doubts at the time about whether that much investment was needed," al-Kaabi said, commenting on the decision to go ahead with NFE. "Especially given the discussion about the energy transition, and the demonising of investments in oil and gas."

Now perspectives have changed, he said, in light of the energy supply crunch, which was exacerbated by fallout from the conflict in Ukraine that began last year.

Concerns about security of supply, affordability and sustainability move in cycles, he said.

"If you look back at history, in the 1970s there was the oil crisis and the concern about security of supply, and then in the 80s and 90s it was about the affordability of oil and gas," he explained. "And then after the 1997 Kyoto Protocol it was all about the sustainability of energy."

Once more the cycle is repeating, he said. Concerns about sustainability are now giving way to concerns about security and affordability.

The unprecedented spike in global gas prices was in no small part due to the Ukraine conflict and Russia's subsequent drastic cut in pipeline gas supply to Europe. But high prices today are also the result of a broader trend of underinvestment in supply that goes back a decade, al-Kaabi said. And the current scarcity of supply would have been much more painful had it not been for unusually warm weather last winter.

"And investment is still not coming in at the level we think it should," he warned.

Talk of rushing to ditch fossil fuels in developed nations is "selfish," he added, given the growing energy needs of the developing world. "There are a billion people in the world that are still deprived of basic electricity that we need today," he said.

The minister pinned the blame on legislators that have pushed far too fast a transition away from fossil fuels in the current energy crisis.

"We need to be realistic about what we can achieve," he said. "We need a baseload of sustainable and reliable energy like gas, and like nuclear, to cover the intermittency of renewables. We need to do more with renewables, but we need a balance."

He went on to stress the sustainability of Qatari energy, noting that the country boasted the largest CO_2 sequestration in the MENA region. Today it sequesters more than 2mn tonnes of CO_2 annually, and this will rise to 11mn tonnes within a few years, he said. Qatar is also using solar energy to power its LNG facilities.

"So the carbon intensity of our LNG is probably the lowest in the world," he said.

Forty percent of new LNG due to arrive on the market by 2029 will be produced by Qatar, he said, adding that Doha avoided short-term thinking about energy supply and pricing.

"If you look at anything on a short-term basis, then all your decisions are completely skewed, whether it's a very low price environment or a very high price environment," he said.

Qatar's preference is long-term contracts structured with stable pricing, he said. The country recently signed the longest ever LNG contracts on record, with China's Sinopec and CNOOC, spanning 27 years.

"If it wasn't for a fair and sustainable price that would be sustainable for 27 years, they wouldn't have signed and we wouldn't have signed," he said. "We're not greedy, we don't try to take advantage. We are very fair in how we structure our contracts.

The minister predicted that Qatar would sign contracts for a record amount of LNG supply this year – a record not only for the country but the entire industry.

"I've never said something that I do not deliver on," he said. "And I don't think such a year will ever be repeated again."



Randy Boissonnault, Canada's associate minister of finan

Canada needs an "at scale" LNG economy: Boissonnault

Dale Lunan

Canada needs an "at-scale" LNG economy to keep up in the global climate change fight, Randy Boissonnault, Canada's associate minister of finance said in a keynote address to the LNG2023 conference on Tuesday.

"The world's major economies are moving at an unprecedented rate and pace to fight climate change, retool their economies and build the net zero industries of tomorrow," he said. "Canada must keep pace because we cannot afford to fall behind – that is why the development of an at scale LNG economy is a strategic priority for Canada."

And he opened his address by echoing a statement by US President last March when he addressed the Canadian Parliament: "The world needs more Canada, whether it's critical minerals, or hydrogen or grains, or artificial intelligence or LNG. Canada has what the world wants."

Boissonnault's message was the strongest expression of support for Canada's LNG aspirations from the federal government in quite some time. Last summer, as Germany sought to source more natural gas from Canada, Prime Minister Justin Trudeau said there was no business case for delivering Canadian LNG to Europe, and instead suggested Germany pursue hydrogen opportunities in Canada.

Since Russia's invasion of Ukraine in February 2022, the world has realised the need to work together to eliminate energy poverty, enhance global security and maintain a strong focus on effectively combating the climate crisis.

"In this context, Canada is well positioned to be a stable and reliable global supplier of choice," he said. "We... have the ability to produce LNG with the world's highest environmental standards and lowest emissions."

Canada, he said, was also the first country to support the Global Methane Pledge, a commitment to reduce oil and gas methane emissions by at least 75% below 2012 by 2030.

"The fact is, we are facing a changing climate, and to use a very Canadian statement, we must skate to where the puck is going."

Putting sustainability first

Enbridge Inc. and the Athabasca Indigenous Investments announced a landmark equity partnership in 2022, which gave 23 First Nations and Métis communities a direct economic stake in seven pipelines.



Amid the global movement towards a net-zero economy, demand for energy continues to intensify. Enbridge is well positioned to meet this demand today and in the future through an energy transition strategy built on a strong environmental, social and governance framework that guides the company's actions and decisions.

"ESG is embedded in our business," says Greg Ebel, Enbridge's president and chief executive officer. "We've set ambitious goals across all aspects of ESG with clear pathways to achieving them, and we use our environmental, social and governance framework to track, manage and convey our progress to customers, investors and other stakeholders. We've established specific plans across businesses and have aligned our executive compensation and financing costs to ESG performance strategies."

To advance its environmental goals Enbridge has, over the last two decades, invested in renewables — such as wind, solar, geothermal and renewable natural gas — and, more recently, in lower-carbon energy technologies. The company has also taken actions to lower operational emissions and reduced emissions intensity by 27% from 2018. In 2020 Enbridge became the first midstream company in Canada to commit to operating on a net-zero basis by 2050.

In 2020, Enbridge launched a first-in-North America hydrogen blending pilot project in Ontario, followed soon after by a similar but larger project in Quebec. A 480-megawatt wind project in Saint-Nazare — France's first commercial-scale offshore wind facility — also came online in 2022.

During this same period, Enbridge acquired Tri Global Energy – one of the top utility-scale renewable energy developers in the United States – and announced plans to build a carbon capture and sequestration hub in Wabamun, Alberta, in partnership with First Nations and Métis communities in the province.

"We've made significant progress in advancing low-carbon business opportunities," says Pamela Carter, chair of Enbridge's board of directors. "We're bridging to a cleaner energy future by innovating across our value chain, and by systematically engaging every part of our business to meet our greenhouse gas targets."

Enbridge has also advanced inclusion and opportunity throughout the company and in the communities where it operates. In 2022, it published its first Indigenous Reconciliation Action Plan, which laid out the company's intention to be an even stronger partner and employer in Indigenous communities and tracked progress against commitments.

The report also shone a spotlight on recent partnerships with Indigenous peoples, including the landmark Athabasca Indigenous Investment equity partnerships, which gave 23 First Nations and Métis communities a direct economic stake in seven pipelines that run through their traditional lands.

Within its workforce, Enbridge is on track to achieve its diversity and inclusion targets based on gender, underrepresented ethnic and racial groups, people with disabilities and U.S. protected veterans. Enbridge also remains committed to its duty to keep the public, members of its team and the environment safe. By keeping safety front and center, Enbridge has made a 23 per cent improvement in employee and contractor safety over a three-year average, moving the company closer to its goal of zero injuries.

These advances against environmental and social goals are paralleled by leading corporate governance practices to achieve a culture of responsibility of accountability. In addition to a board structure designed for independence in decision-making and diversity of thought, experience and perspectives, Enbridge strives to ensure board members are well-equipped to oversee ESG matters, including climate change risk and energy transition.

"At Enbridge, our mission is to deliver energy — safely and reliably every day of the year," says Ebel. "As energy sources and uses evolve, we remain well positioned to continue delivering the energy the world needs to fuel quality of life. And by embedding ESG into and across all our businesses, we can ensure Enbridge will grow sustainably for many decades to come."

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Joseph Murphy



Shamsairi Ibrahim, Vice President of PETRONAS LNG Marketing & Trading

Balancing energy transition with security

Shamsairi Ibrahim, Vice President of PETRONAS LNG Marketing & Trading, discusses the company's position on balancing energy security, affordability and sustainability, its views on the future role of LNG and its development of low-carbon technologies.



PETRONAS is the first energy company to own and operate two FLNG facilities and is developing the first nearshore LNG facility in Malaysia, located at Sabah.

Summarise PETRONAS position regarding the energy trilemma of security, affordability and sustainability?

A year has passed, and we have gone through multiple events that has shaken the energy market, making it more volatile with energy security a pressing concern for many nations.

It is important to note that the energy trilemma is unique to different nations and economies. Some nations are able to focus on sustainability, while others are challenged with energy security and affordability.

This is why, at PETRONAS, we take the view that the energy transition must be undertaken in a just and equitable manner. To this extent, the focus of the transition must be balanced with greater emphasis being put behind stabilising supply to meet the rising demand for energy.

In terms of providing energy accessibility and security, natural gas is an abundant source. It will still be relevant in the coming decades, as more and more modern, scalable and economical technologies are being adopted to monetise gas in a safer, cleaner and more responsible way.

PETRONAS being an established LNG player with more than 40 years of experience, takes a realistic path to a low-carbon future and will continue to advocate gas and LNG usage to complement renewables.

Global natural gas prices have subsidised significantly in the last six months. Can we consider the immediate threat of gas shortages in Asia and Europe over?

Although global natural gas prices have indeed subsided significantly, it does not necessarily mean that the immediate threat of gas shortages is completely over.

What we are facing today is not merely caused by the Russian-Ukraine conflict, but a compounding effect of the less-than-modest investments in upstream over the last few years when LNG demand is growing, amid a shift in focus to renewables.

To ensure the sustainability of the gas industry, producers, consumers and governments have an equal responsibility to create a harmonious LNG ecosystem. As long as conditions remain the same, the threat of energy shortage will not be over.

We need stronger collaboration between all parties across the value chain and stable investments in new gas fields and infrastructures in making LNG/gas more accessible, to ensure supply demand is balanced.

At PETRONAS, we believe in a balanced approach which combines responsible development of conventional and unconventional resources with renewable energy to ensure global energy security and to support the movement towards a net zero carbon emissions future.

What is PETRONAS main message to investors, policymakers, and the energy industry in terms of avoiding future energy crises?

We need to remember that there is no perfect set of rules in the energy transition. Any transition requires continuous learning and refinements, whereby the key action here is to start doing something.

Thus, it is essential for all parties across the value chain to collaborate and take collective action to create a sustainable and harmonious ecosystem and prevent future energy crises from occurring by learning from valuable lessons of the past.

There are 2 key areas that all parties should focus on:

- Stronger collaboration and table investment in new gas fields in making LNG and gas more accessible. These include infrastructure readiness, technical and financial support. As new facilities development requires huge investments, it's imperative for producer and consumer to collaborate to create mutual benefit.
- Pivotal role of financing bodies. The rise of ESG (environmental, social, governance) financing as announced by major banks in the region is a great milestone as it shows their appreciation and support for cleaner energy projects including LNG.

We, at PETRONAS, are firm believers in taking accountability and playing our part to ensure a just transition that allows progress and sustainable development for all. We must move forward, taking practical steps towards a low-carbon future together.

To what extent has a tightened LNG market impacted global emissions?

The cost of a tightened LNG market has forced the hand of governments and nations to turn to higher emissions energy sources such as coal.

As an LNG producer, PETRONAS is fully supportive of all endeavours to improve liquidity and stability in the market.

We hope that after a few years of operating in a volatile environment, industry players will begin to realise the importance of security and stability of LNG supply.

We believe that long-term contracts and a stable long-term pricing mechanism will not only be able to address the pricing volatility faced by the industry but also establish long-term and sustainable gas demand from buyers. This is also critical for producers who are developing LNG exporting projects which require huge investments and a long gestation period.

We believe that under any market conditions, the approach to LNG supply remains to be anchored on close collaboration with both sellers and buyers to ensure business sustainability and reliability which is mutually beneficial for all parties involved.

At PETRONAS, we recognise that the LNG market is dynamic and is influenced by various geopolitical, economic and →

At PETRONAS, we take a realistic and middle-ground view of the energy transition, as renewables alone cannot be the answer toward meeting global energy demand.

Shamsairi Ibrahim, Vice President of PETRONAS LNG Marketing & Trading

environmental factors. However, we remain firm believers of LNG, as the cleanest burning fossil fuel to be the ideal transitional energy source that will ensure global sustainable development.

Walk through how PETRONAS is contributing to increased global LNG supply with its new project pipeline? What is the current status of LNG Canada Phase 2 and Petronas' third FLNG project in Malaysia?

One of our upcoming projects that is expected to come onstream by the middle of this decade is LNG Canada. At full capacity, LNG Canada will expand our portfolio by 14mn metric tons/year.

PETRONAS and our joint venture partners are currently evaluating options for phase 2 of LNG Canada.

As for PETRONAS' third FLNG project, a final investment decision (FID) was taken in November 2022, for a nearshore LNG facility in Sabah.

The engineering procurement, construction and commissioning (EPCC) contract for the project was awarded to the winner of front-end engineering design (FEED) competition (JGC Corporation and Samsung Heavy Industries).

The nearshore LNG facility, located at Sipitang Oil and Gas Industrial Park (SOGIP), Sabah, is planned for completion by 2027. This project will grow our production portfolio by another 2mn mt/yr of LNG. Beyond these two projects, PETRONAS is also partnering with YPF to explore an integrated LNG value chain in Argentina.

Should LNG be considered a transitory or end fuel on the road to net zero?

At PETRONAS, we take a realistic and middle-ground view of the energy transition, as renewables alone cannot be the answer toward meeting global energy demand.

The challenge of intermittency in renewable energy supply continues to persist which in turn impacts the energy reliability and security that industries and businesses require.

This is where natural gas plays a crucial role and forms the core ingredient of the energy transition.

As the cleanest burning fossil fuel, natural gas is the perfect complementary partner to address intermittency issues faced with renewables. For example, how natural gas can partner solar to provide an uninterrupted supply of energy 24 hours a day, even when the sun is not shining. Natural gas as fuel is already a mature technology and advanced with multiple adoption technologies capable of meeting stricter carbon reduction regulations.

On the flip side, the use of renewables to power LNG production plants is a viable way of reducing the plants carbon footprint. In fact, we've signed a deal for 90 MW of hydroelectricity that will be used to gradually power the PLC from 2024 onwards and will enable us to decommission old and inefficient gas turbines.

How should LNG retain its social licence?

At PETRONAS, we believe that there are two key areas for the LNG industry to look into to retain its social licence. First, by decarbonising the LNG production process. Second, by leveraging LNG's proven technologies to accelerate the development of clean and renewable energy sources.

Allow me to share ongoing examples of how we are doing so. Firstly, we continuously strive for Operational Excellence to keep our assets and operations not just in order, but more importantly, optimised, efficient and clean. For example:

- We aim to reduce our Scope 1 and 2 GHG emissions from our assets, at 49.5mn mt of CO_2 equivalent by 2024 to achieve our net zero carbon emissions goal by 2050. We continue to mitigate and reduce emissions at our operations based on the guiding principles of measure, reduce and offset.
- From 2024 onwards, PETRONAS LNG Complex (PLC) in Bintulu will gradually be powered by hydroelectricity and will allow us to decommission old and inefficient gas turbines.
- By 2025, carbon capture and storage at offshore Sarawak gas field (Kasawari) will come on stream with the potential to reduce CO_2 emission of around 76mn mt.
- We are decarbonising our marine transportation by applying gas burning of LNG ships at both our buyers and our own terminals (18 terminals) during loading / discharge.
- We've upgraded our LNG vessels with Hull Performance Solution technology to cut bunker consumption, reducing around 18,000 mt of CO_2 emission annually.
- We implemented a digital solution at the PLC, designed to increase energy efficiency in the liquefaction process and to optimise boil-off gas (BOG) use and raw feed gas for fuel gas consumption known as ARIES.
- In addition, our two floating LNG (FLNG) facilities have adopted N+0 gas turbine generator (GTG) operating philosophy to reduce the total fuel gas requirement for the GTGs and zero-flaring practice during offloading to ensure optimal operating conditions.

Secondly, we are working with multiple partners to grow our portfolio of low carbon solutions such as:

- Collaborating with key industry players, such as JERA, to develop ammonia and hydrogen.
- Conducting a joint technical and commercial feasibility study with ENEOS Corporation (ENEOS) to produce low carbon hydrogen from PETRONAS' existing facilities, production of green hydrogen from a new hydro-powered electrolyser facility, and hydrogen conversion into methylcyclohexane (MCH).
- Developing a carbon sequestration hub with Shell to collect, aggregate and sequester carbon from various domestic and international sources.
- Combined efforts with Japan Petroleum Exploration Co. Ltd. (JAPEX) to evaluate optimal capture, storage and transportation methods, as well as estimation of emissions, capture volumes and monitoring methods of CO_2 stored underground.
- Formed a global alliance and collaboration for LNG bunkering at four locations in Japan. Offshore wind and LNG bunkering alliances to develop solutions in hydrogen, ammonia and carbon capture and storage (CCS).
- Utilising CCS technology (JOGMEC, JX Nippon Oil) for studies to develop high CO_2 gas fields in Malaysia.

Joseph Murphy



The pathway to eliminating methane emissions

Julien Perez, Vice President, Strategy & Policy, Oil and Gas Climate Initiative (OGCI), discusses with NGW the pathway towards eliminating oil and gas sector methane emissions.

To what extent do you feel that methane emissions from the oil and gas sector can be underreported in some cases, or indeed overreported in other ones. What role does innovation have to accurately quantifying the problem?

The oil and gas sector contributes around 20% of total methane emissions, with the remainder coming from other sectors and industries. According to the International Energy Agency's latest estimates, methane emissions from the oil and gas industry are around 2.4 gigatonnes of carbon dioxide equivalent. This is nearly half of the industry's Scope 1 and 2 emissions.

According to the International Energy Agency, eliminating those emissions by 2030 would be equivalent to removing two-thirds of the global transport sector's greenhouse gas emissions. Eliminating those methane emissions will play a key role in meeting the Paris Agreement's targets.

OGCI has supported the science behind measuring and monitoring methane emissions in the oil and gas sector as well as research and development of the technologies required.

These include our support of the Methane Science Studies, overseen by the government-led Climate and Clean Air Coalition, to increase scientific knowledge and understanding of methane emissions from different types of sites across the global oil and gas industry.

To improve identification of methane emissions sources, better understand their frequency and persistence, OGCI is working with the Methane Guiding Principles and others to establish common industry practices to deploy technologies effectively in specific settings both onshore and offshore.

Since 2020, OGCI has supported the World Bank's Global Gas Flaring Explorer platform to help deliver improved transparency in flaring data from satellites.

We now feel that there is a sufficient range of tools available to the industry to improve the precision of the data that is collected. Our member companies are already deploying such technologies at the majority of their assets and sharing their experience with the rest of the industry, which helps to improve overall market capacity.

In addition to the science and technology around monitoring and measuring, OGCI has also focused on increasing the reporting and transparency of the data from our member companies.

OGCI member companies have standardized and regularly streamline the methodologies used to collectively report greenhouse gas emissions and spending on low-carbon technologies. The data submitted by companies is independently verified by EY.

OGCI's aggregate data is reported annually and published on our website. We use the data to set baselines and track progress for collective emissions reduction targets.

How quickly could methane emissions from the oil and gas sector be eliminated, and how can this be achieved?

There's a huge opportunity to cut methane emissions from the oil and gas sector. According to the IEA, methane emissions can be reduced by over 75% by implementing available measures such as leak detection and repair programs and upgrading leaky equipment.

Eliminating methane emissions has always been a core priority for OGCI and our member companies have already shown what's possible. Since 2017, OGCI's member companies have collectively reduced absolute upstream methane emissions by 40% and reduced flaring by a third.

We believe it's possible to achieve near zero methane emissions by 2030 from operated oil and gas assets by sharing best practise, deploying technology and building capability through initiatives, partnerships and collaboration.

New technologies, including monitoring with satellites, drones and sensors, make it easier to detect and better quantify methane emissions allowing the oil and gas industry to address methane emissions in a more meaningful way.

To achieve similar levels of success across the industry, we are calling on companies to join our us in the Aiming for Zero Methane Emissions Initiative, which aims to reduce methane emissions to near zero by 2030.

The initiative is growing fast, sending



Julien Perez, Vice President, Strategy & Policy, Oil and Gas Climate Initiative (OGCI)

a strong signal that the industry is ready to take action on methane emissions. We already have around 90 supporters and signatories., and I expect support to expand further this year.

We're calling on oil and gas producers, service companies and others supporting the industry such as specialist technology providers and consultancies to join our collective effort.

To what extent will this rely on scaling up current technologies and to what extent on innovating new ones?

We need to do both as there isn't just one approach for eliminating methane emissions across different types of facilities in different locations.

There are already many cost-effective technologies that companies can use to detect, quantify and abate methane emissions. For example, advances in satellite technology have made it possible to detect methane emissions across large areas.

OGCI has been at the forefront of this work with its satellite monitoring campaign over Iraq which used a combination of satellite observations at the country and asset level to identify major sources of methane emissions. We are now working to expand this campaign to many more countries.

In addition, we are this month publishing guidance on how to achieve near zero methane emissions that includes a four-step pathway for operators to follow to eliminate methane emissions.

At the same time, we need to continue to support innovation to detect, quantify and abate all forms of methane emissions across all sectors cost-effectively.

Tech integration is at the heart of the energy transition: Siemens



Richard Voorberg, President North America, Siemens Energy

There is no silver bullet, but a wide range of technologies needed to address climate change. The challenge is integrating these technologies into a single, coherent energy system, says Richard Voorberg, President North America, Siemens Energy.

Ross McCracken

Speaking to *NGW* at the LNG2023 conference in Vancouver, July 11, Voorberg said many technologies were required to build sustainable energy systems, using a wide range of energy sources from renewable electricity generation to low carbon gas provision.

A prime example, he said, is the electrification of the gas liquefaction process, an area where Siemens are involved with a number of North American LNG projects such as Woodfibre LNG and Western LNG.

Electric drive trains and compressors can drastically reduce greenhouse gas (GHG) emissions from the liquefaction process and free up more gas for delivery as LNG. Companies providing low carbon LNG can often achieve premium pricing, boosting further the commercial case for electrification.

But the emissions savings depend critically on the carbon intensity of the electricity provided, and on transmission infrastructure to deliver clean power to the LNG plant, which represents a major new load on a grid. Wider LNG decarbonisation therefore depends on power sector decarbonisation and grid infrastructure investment, highlighting the interconnectedness of the energy transition and the need for services which span gas and electrical engineering, according to Voorberg.

In British Columbia, where power generation is dominated by clean hydropower, this works well. LNG Canada Phase I and Woodfibre LNG will both use BC Hydro's low carbon grid electricity to power their liquefaction processes. However, LNG Canada Phase 2 is more uncertain as it depends on new transmission infrastructure.

Further south in the Gulf of Mexico, where the bulk of existing and under construction US liquefaction capacity is located, gas turbines proliferate, owing to the lack of low carbon power generation and transmission infrastructure. Voorberg says if the infrastructure and low carbon power were in place, the GoM would present major opportunities for electric retrofits, reducing the US LNG industry's carbon footprint significantly.

Hydrogen and CCS need system integration

Voorberg sees further potential for technology integration, for example with hydrogen. LNG plants need consistent power and hydrogen could be used as a storage medium to address renewable energies' variability. Costs need to fall some way before this can become a reality, and economies of scale are key to cost reductions, Voorberg says, estimating that electro-H2 production will not become competitive with natural gas until the early 2030s.

However, that is not stopping companies from taking the plunge now in areas such as e-fuel production. Siemens Energy offers an 18-MW PEM technology electrolyser, one of the largest of its kind. Interest in the electrolysers has rocketed since the introduction of the Bipartisan Infrastructure Law and the Inflation Reduction Act, according to Voorberg.

Interest in Carbon Capture and Storage (CCS) has also jumped as a result of the new incentives. Capturing and storing emissions from the liquefaction process again reduces the carbon footprint of LNG production. CCS, whether from Direct Air Capture or industrial processes like liquefaction, requires efficient compressors and integrated solutions to keep costs low, Voorberg said.

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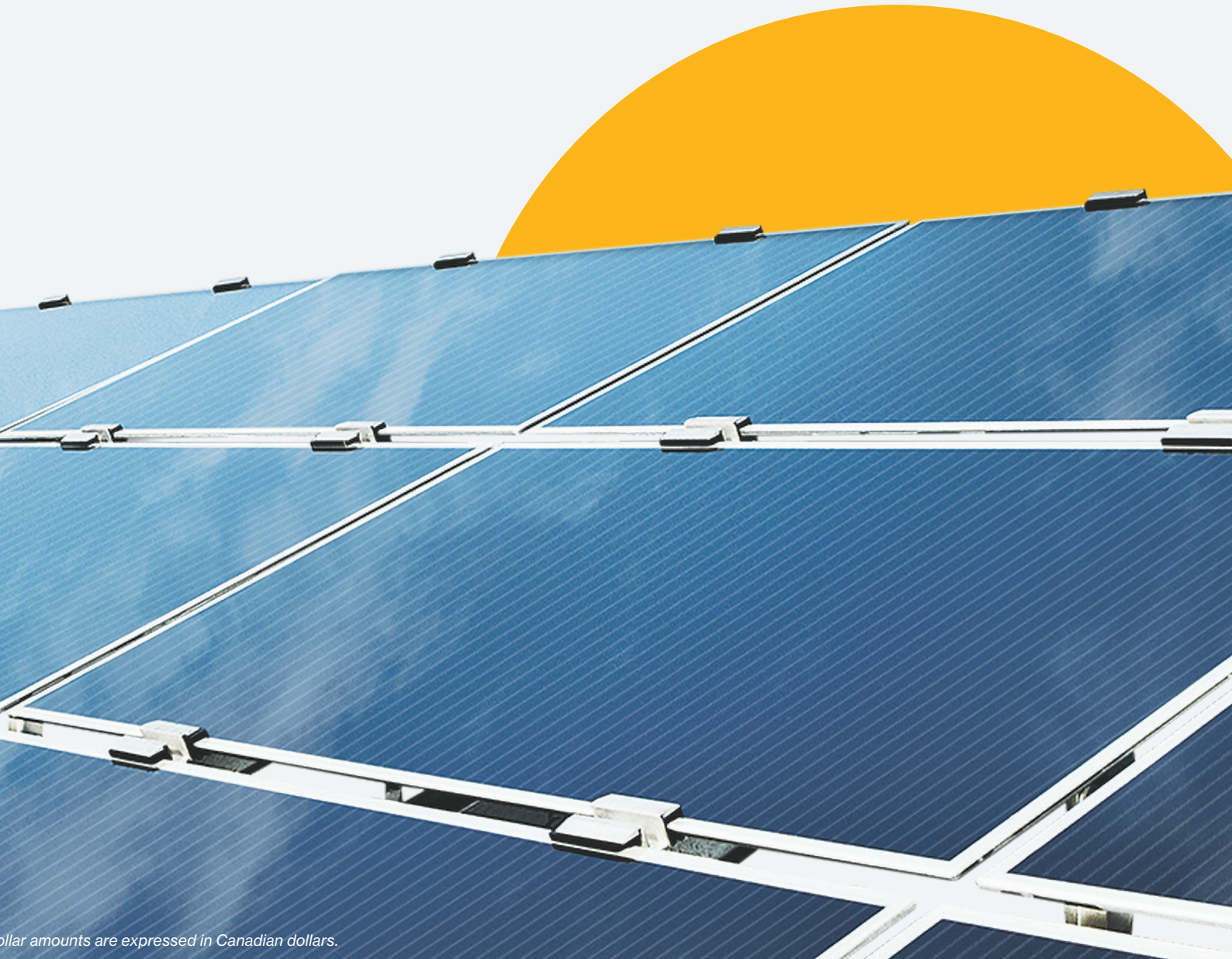


ollar amounts are expressed in Canadian dollars.

Demand for natural gas will remain strong, say panellists

Monte Stewart

Natural gas will not be displaced as a major energy source any time soon, say experts who participated Tuesday in a panel discussion on Natural Gas and the Future Economy.

Demand will remain strong despite government efforts to demonise fossil-fuel production, as well as decarbonisation and the global transition to clean energy, technological change and other market pressures, the panellists predicted in a session on the future of natural gas.

"I don't see large-scale substitution of gas demand, outside of Europe, in the coming decades," said De la Rey Venter, CEO and managing director of MidOcean; EIG. "In most places, new technologies will gradually take an increasing share of incremental demand. But it's an additive and evolutionary change process. And, therefore, long-term demand for gas, and also for LNG, is just not something that keeps me awake at night."

Natural gas demand will be alive and well in the energy system of 2050 for many reasons.

"The first is the need to underpin the massive increase in electrification of the global energy system," he said. "That must happen – and that will happen. And, policymakers today understand just how critical it is that something underpins this massive increase in electrification.

"And, that's something that needs to be available today – not in 2035, not in 2045, but today. In the two decades that I've been intimately involved with advocacy for gas, this is the first time that I sense policymakers around the world get this reality."

The second reason for his optimism: Most of the increased demand – especially the demand east of the Suez Canal, which could cause the LNG to double in size over the coming decades – is structural demand. That means most of the supply can only be transported via ocean ships, not pipelines, he added.

"The third reason for my belief is that we, humankind, always overestimate the pace at which change can happen in the energy system – and the pace and time that it takes to scale-up anything new."

He stressed that International Energy Agency outlooks are "scenarios" rather than forecasts. He said the one calling for net-zero emissions by 2050 has been particularly harmful to energy transition because it has provided activists with an argument that no more oil and gas projects should be built. that the aim to achieve net-zero emissions by 2050 is a scenario rather than a forecast that must be met.

Kevin Gallagher, CEO of Santos, pointed to burgeoning demand in Asia, noting that forecasts call for demand growth of up to 50% in that region. He also noted that most of the world's fertiliser supply is produced by using natural gas.

"I believe that abated oil and gas is going to play a very big part of the energy mix, not only in Australia, but across Asia and globally for many decades to come," said Gallagher.

Gas can also reduce the world's reliance on coal, he believes.

"Government should be trying to drive more supply of natural gas to force coal out of the market," he said.

Instead of demonising the oil and gas industry, governments should be getting behind it to accelerate the clean energy transition.

"Because for that transition to happen, you need the oil and gas industry to transform," he said.

Cynthia Hansen, an executive vice-president, and president of gas transmission and midstream at Canadian energy services firm Enbridge, said there is a critical position for natural gas in the future, as fossil fuels still provide about 80% of the world's energy supply. LNG can be used to reduce global emissions.

"We've seen that in the US, switching to natural gas from coal has had a tremendous impact on reducing overall GHG emissions – at least 20%," she said.

Hansen and other panellists said all components of the energy system will be needed to curb emissions. She called on energy infrastructure developers to do a better job on advocating for natural-gas projects.

"I think we have to get out there and explain things better to the voting public who actually helped set the (government) policies," she said.

Mark Loquan, president of Trinidad and Tobago's national gas company, pointed to underinvestment in renewables as a need for investing in oil and gas. He said China and India are investing in more coal projects because they can not meet their energy needs as their populations increase.

The key to achieving the energy transition will be to curb emissions in the globe's northern markets.

According to Venter, the natural-gas market should not fear price spikes like the ones that resulted from Russia's invasion of Ukraine. The world, he said, has enough discovered natural gas that can be extracted profitably and responsibly.



More LNG needed to mitigate future energy shocks: Diplomatic Forum

Ross McCracken

A diplomatic forum with attendees from over 30 countries, held on the sidelines of the LNG2023 conference in Vancouver, Canada, July 11, found a strong consensus on the positive role enhanced LNG supply can play in mitigating future energy shocks and energy price volatility.

The findings come after a turbulent period in which LNG spot market prices have travelled from record lows too record highs before returning to a semblance of normality in the space of just three years, owing primarily to the impacts of the Covid-19 pandemic and Russia's invasion of Ukraine.

These shocks to the market have refocussed policy and industry attention on immediate issues of energy security, highlighting the need for cleaner, safer and more reliable sources of energy, the forum found. While many energy-importing countries are reviewing the role of LNG over time, the commitment to the fuel is long term, given its key role in providing energy security and a lower emissions alternative to coal, according to Mel Yveros, executive director of LNG2023, who reported the forum's conclusions.

However, what energy importing countries need is affordability, reliability and diversity of supply. Yveros said the "energy crisis is not over. As we navigate our way out, LNG will be needed to grow economies, particularly in the developing world."

"The energy crisis is a compex challenge with differing approaches in view of the diversity of energy mix and circumstances around the world. It is clear that there can be no energy transition without Asia and the rest of the Global South. And that the Global South will approach the transition in their own way," the forum's communique said.

"Canada can play a significant role in adding low carbon intensity LNG supply to the market, reducing global emissions while at the same time providing oppotuntities for economic reconciliation with many indigenous communities," the communique read.



Emerging economies will look to gas to solve the energy trilemma

Dale Lunan

Europe has, especially since Russia's invasion of Ukraine highlighted the need for energy security, figured out that natural gas is a key component to solving the energy trilemma – affordable, reliable and secure energy.

Now, emerging countries are beginning to realise that they too can look to gas to meet those same needs, a morning session Tuesday heard.

Jack Fusco, CEO of Cheniere Energy, said experience in the US with using natural gas to provide secure, reliable and affordable energy dates back to 2007, when carbon dioxide emissions there peaked.

"Today, we've dropped those emissions by 50%, give or take," he said. "The majority of that 50% was because of coal to gas switching in America."

Now with LNG, Cheniere is exporting its experience to reduce carbon emissions as quickly as possible, Fusco added.

"That's why one of our tankers, if it goes to displace a coal-fired power plant, helps the world to breathe 250,000 metric tons of carbon dioxide less," he said. "That's how we're helping with the energy trilemma."

Keith Martin, chief commercial officer at PetroChina, noted that Europe, which realised early on that renewables couldn't replace Russian piped gas supplies, moved reluctantly to LNG imports, and it remains "massively exposed" to price spikes. Its balancing mechanism consists of a small amount of storage and demand response – business will start to shut down.

"Compare that to Asia, and to China in particular, where gas is seen as an absolutely essential part of the energy transition – it's seen as supportive, and it's seen as necessary as well."

But Tan Sri Tengku Muhammad Taufik, CEO of Malaysia's PETRONAS, cautioned that the task of obtaining affordable, reliable and secure energy in emerging economies is not going to be easy or smooth, largely because the path to decarbonisation is being charted by those far from the emerging economies of Asia.

"We've often heard the narrative around the global south, building up an angst or anger against what seems to be distant unrealistic levels set by people far away," he said. "How will businesses in Bangkok respond to a policy decision made in Brussels?"

Asia has economies that range in GDP per capita from less than $2,000 to more than $9,000, and in the context of the energy trilemma, many in Asia are pursuing the very growth in energy prosperity "that has been enjoyed here" for much of the past century.

"Asking emerging Asia to pivot in the space of less than a decade is patently unfair, it is patently unrealistic, and with regards to setting hurdles and targets which are unrealistic, they're not going to listen," he said. "For many families in Asia and Africa, it is more about being able to put food on the table next week than to ensuring a sustainable future decades hence."

Dealing with the energy trilemma, he said, is a very complex and systemic challenge.

"It won't be solved by one government, it is going to take multiple governments collaborating," he said. "It's going to take private sector and industry working together, and it's going to take the financial institutions to gain a hell of a lot more energy literacy than they've shown so far."



Importance of ESG cited in access to LNG Capital

Elsie Ross

ESG, including equity and partnership opportunities for Indigenous groups, will be increasingly important in attracting financing for future LNG projects, a session on financing the next wave heard this week.

In North America, ESG may take the form of indigenous equity and partnerships and can play a critical role, said session moderator Michele Harradence, EVP and president, gas distribution and storage at Enbridge Inc.

"Sometimes actually having a social licence to operate or even partnering with a First Nation can unlock financing through various government initiatives," added Kristy Kramer, vice-president of gas and LNG research for Wood Mackenzie.

Session attendees in an instant poll also agreed that an LNG project becomes more attractive to lenders if it has better ESG attributes, with 80% of those polled supporting the statement.

But ESG by itself isn't enough, said Dan Brouillette, president of Sempra Infrastructure. "[Financiers] are looking for low-carbon, high-value projects."

Banks or institutional investors will be more interested if a company can show a project has economic or security to the extent it is replacing hydrocarbons in the market, he said,

WoodMac also saw carbon-neutral carbon shipments decline in 2021 when security of supply came to the forefront, said Kramer. However, when the market returns to normal, it expects ESG, whether carbon-neutral shipments or other ESG attributes, to come back to the forefront, she said.

In recent years, there also have been changes in the economic model for LNG projects with more infrastructure in addition to resource monetization, said Kramer.

In the meantime, traditional banks will continue to be critically important for foundational capital and have embraced infrastructure as an asset class, said Chris Buckingham, director, project finance Americas for MUFG Bank. However, those face increased competition from other projects such as offshore wind.

In recent years, there also have been changes in the economic model for LNG projects with more focus on infrastructure in addition to resource monetization, said Kramer.

However, to support infrastructure such as LNG, "we also have to have the pipelines to support it because it is a value chain," said Dena Wiggins, president and CEO of the Natural Gas Supply Association which represents producers and operators.

It has become more difficult to get pipelines permitted and put into service, she said. Promises in the US debt ceiling bill to reduce regulatory red tape may be a start, though, she said.

A small sliver of silver lining in the Russian invasion of Ukraine is that it shone a spotlight on the importance of supply security, she said. It also has prompted a discussion about energy affordability, according to Wiggins.

"As we are trying to get to a lower carbon energy future, we have to keep our eyes on multiple balls at the same time and they are all very important."

And while early in the Covid pandemic, there was concern about lack of supply, the industry "has come roaring back" with record or near-record levels of natural gas production in the US, she said.



Canada's LNG aspirations not possible without indigenous participation

Dale Lunan

Canada is coming to the global LNG market in the next handful of years, with new projects set to deliver first cargoes in 2025, and a common theme among all of them is significant First Nation participation, a Tuesday morning session at LNG2023 heard.

LNG Canada actively engaged with the Haisla Nation to develop the 14mn tonnes/year facility; Woodfibre LNG, a 2.1mn tonnes/year facility on traditional Squamish Nation lands north of Vancouver, was the first in Canada to receive environmental approval from the Squamish Nation, and Cedar LNG, a joint venture between Haisla Nation and Pembina Pipeline, represents the first majority indigenous-owned industrial project in Canadian history.

Crystal Smith has been chief councillor of Haisla Nation through much of the LNG Canada project's development, and was instrumental in Cedar LNG coming to fruition. Those two experiences with major industrial development on her Nation's traditional lands, she told her audience, have been transformational.

"I've been honored to sit with our leadership and then eventually become a part of our leadership at a time that was definitely most transformational for our community and our membership," she said. "I've watched our nation essentially sitting on the sidelines to watch everybody else prosper off development in our territories and now I see how we are sitting around tables as partners within a project."

Sharleen Gale, chair of the First Nations Major Projects Coalition, shares Smith's passion for indigenous participation in natural gas and LNG developments. As chief of the Fort Nelson First Nation, she has seen first-hand how these developments can pave the way for economic reconciliation.

"I know that by working together, we can make this dream come true."

Roger Dall'Antonia is CEO of FortisBC, a BC utility with exposure not only to other LNG developments, through its participation in the pipeline project that will feed Woodfibre LNG, but also in its own LNG facility on Coast Salish lands in the Fraser Delta region.

"We have set a very high standard, and one of the things that has evolved over time is making sure that impacted communities are at the table and ensuring that their interests are considered," he said. "The case for indigenous participation in projects, I think, is it's absolutely necessary."

Christine Kennedy, CEO of Woodfibre LNG, said indigenous participation in major projects is "absolutely" essential.

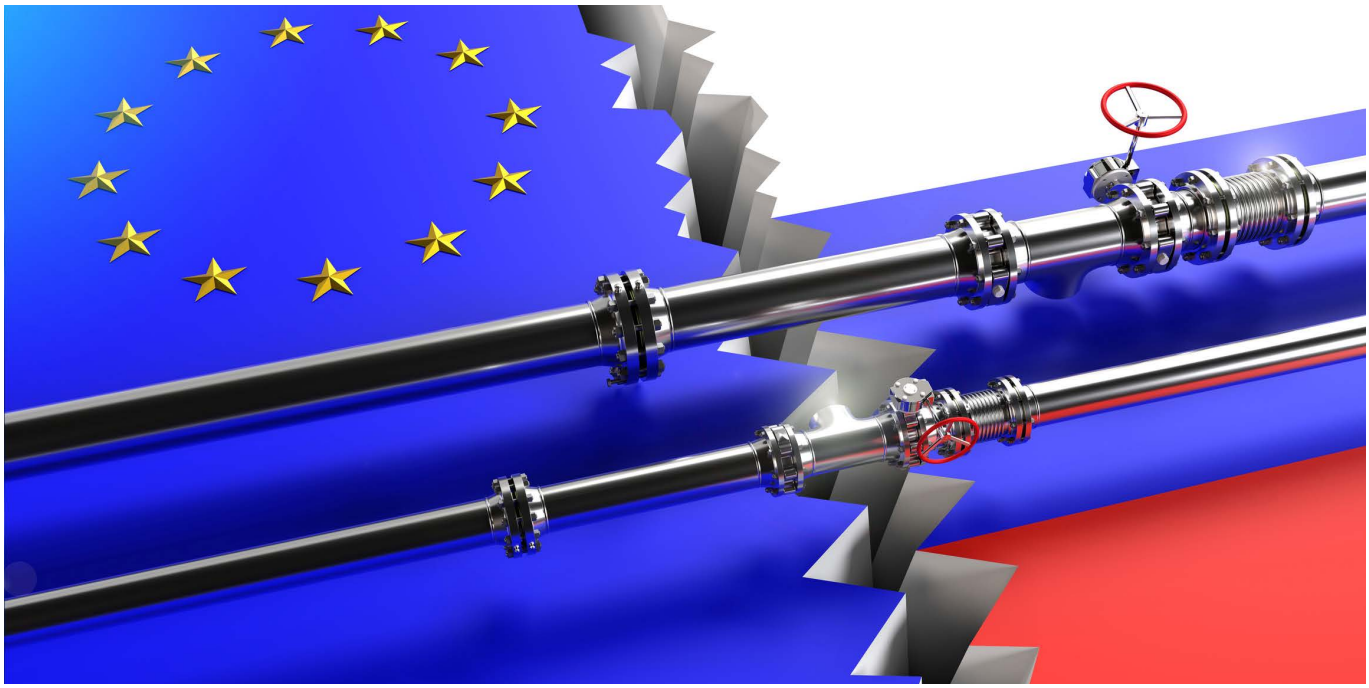
"It's one of the building blocks to be able to build a project in the first place," she said. "It's critical all the way through from the early planning and design stages right through the regulatory cycle and into construction."

But with "600 or so" First Nations across Canada, a cookie-cutter approach to indigenous participation isn't going to work, Chief Gale said.

"We're very diverse, we're not all the same, and not one solution is going to work for all of us," she said.

An estimated $12.6 billion have been taken from her Nation's territories since 1979, and with active indigenous participation, that can change.

"We can do better; we have to do better. We have an energy transition happening here. All these projects cross indigenous lands, and if you're not willing to work with us as leaders to develop these projects, then we're all going to lose the dream, to bring prosperity, to bring the good jobs. I think at the end of the day, what we all want is to have good jobs, to live in nice communities, to drink fresh water and to breathe fresh air."



Russia's invasion of Ukraine shone spotlight on energy security

Elsie Ross

A small sliver of a silver lining in the Russian invasion of Ukraine is that it shone a spotlight on the importance of supply security, a panel heard Monday at the LNG2023 Conference.

It also has prompted a discussion about energy affordability, said Dena Wiggins, CEO of Natural Gas supply, which represents gas producers.

"There are a lot of balls in the air and they are all important," she said.

And while early in the Covid pandemic there was concern about lack of supply, "the industry has come roaring back" with record or near-record levels of natural gas production in the US, she said.

But new infrastructure, including pipelines, are also necessary to support LNG exports, and regulatory approvals for many parts of the value chain have been increasingly difficult to obtain. Wiggins said the promises within the US anti-inflation bill to speed the permitting process may be a start.

In the meantime, traditional financial sources will continue to fund LNG infrastructure projects although they face increased competition from other projects such as offshore wind, said Chris Buckingham, director, project finance Americas for MUFG Bank. He also noted that some financial institutions that had withdrawn from financing pipelines and other LNG infrastructure because of concerns about fossil fuels are beginning to return to the market but not in the numbers that left.

In recent years, there also have been changes in the economic model for LNG projects with more infrastructure in addition to resource monetization, said Kristy Kramer, vice-president of gas and LNG research for Wood Mackenzie.

ESG also comes into play when it comes to attracting financing, the session heard.

But ESG by itself isn't enough, said Dan Brouillette, former US energy secretary and now president of Sempra Infrastructure. "They [financiers] are looking for low-carbon, high-value projects."

In North America, ESG may take the form of indigenous equity and partnerships and can play a critical role in attracting project financing, said Michele Haradance, executive vice president and president, gas distribution and storage at Enbridge.

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