



THE 20TH INTERNATIONAL CONFERENCE & EXHIBITION ON LIQUEFIED NATURAL GAS

# LNG2023

10-13 JULY 2023, VANCOUVER, CANADA

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INCOMING HOST



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# LNG2023 Welcome



On behalf of LNG2023 host organization, the Canadian Gas Association (CGA), I warmly welcome you to Vancouver, British Columbia.

A major participant in the LNG industry, British Columbia is also home to more than 200 First Nations, some of whom are actively involved in LNG development, and LNG2023 will be held on the traditional lands of the Musqueam, Squamish, and Tsleil-Waututh Nations.

The CGA is excited to be hosting international dialogue, technologies and discussions focused on fuelling the affordable, reliable, cleaner, and more prosperous future that LNG promises.

The conference program features a powerful mix of more than 250 international speakers who will present timely technical, commercial, and strategic challenges and opportunities.

The entire LNG value chain is covered in the conference's six key topic areas, represented in a range of program sessions, including leadership dialogues, forum discussions, plenary sessions, and poster presentations.

You can explore the businesses, technologies, and future of LNG at the extensive conference exhibition, featuring more than 200 international exhibitors. LNG2023's open and friendly environment provides you with the perfect opportunity to connect in person, learn, collaborate, and do business.

Thank you for attending and let's get together in Fuelling a Secure Energy Future.

**Menelaos (Mel) Ydreos**  
Executive Director LNG2023





Welcome to LNG2023 in Vancouver that includes our conference on the water, so fitting for what is essentially a maritime industry.

LNG is faced with complex and sometimes conflicting expectations that include a role in energy security and indeed in supplying growing energy demand, while avoiding pollution in all its forms and remaining, all the while, affordable.

We believe resolution of these will benefit from the dialogue generated in our 4 days together. To facilitate this, we have endeavoured to build a conference that is broader and more interactive than ever before.

We hope you find this Event Guide a useful supplement to the event App and signage. Here are my tips to get most out of the event:

- Download conference App, view the full programme and build your own agenda;
- Use the six coloured themes to match sessions to your interests;
- If you are not sure which of the breakout sessions to join, the Autumn Sessions (211-214) could be thought of as our “centre court”, housing sessions that polled high in our surveys;
- Interact with the speakers. Questions may be asked in advance of the sessions via the App, orally from the session floor, or after the session. For the latter, go to the ‘Meet the Speaker’ corner after, and just outside each session.

I would like to extend a special thank you to our Programme Committee members for their hard work and dedication on delivering an exemplary program for LNG2023.

**Philip Hagyard**  
LNG2023 Programme Committee Chair



# Event overview

Welcome to the LNG2023 Conference & Exhibition, we are thrilled to have you join us at this momentous and preeminent global event discussing **Fuelling a Secure Energy Future**.

The LNG2023 Conference Programme has been designed to dive deep into every aspect of the LNG value chain with themes spanning the process of LNG, the business of LNG, and the future of LNG. Hear from 250 LNG speakers who will address and discuss the most important issues facing the LNG industry today through a mixture of session types including Plenaries, Leadership Dialogues, Spotlight Sessions, and Paper Presentations.

## REGISTRATION ONSITE AND BADGE PICK UP

If you did not have time to collect your badge yesterday, all new LNG2023

registrations and badge collection will take place at the Fairmont Waterfront Hotel in the Malaspina Room (a 4-minute walk directly across Canada Place from the Vancouver Convention Centre East Building).

## REGISTRATION OPENING TIMES

Monday 10 July 2023	07:00 – 16:30
Tuesday 11 July 2023	07:00 – 16:30
Wednesday 12 July 2023	07:00 – 16:30
Thursday 13 July 2023	07:00 – 12:00

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.

We look forward to seeing at the Vancouver Convention & Exhibition Centre today!

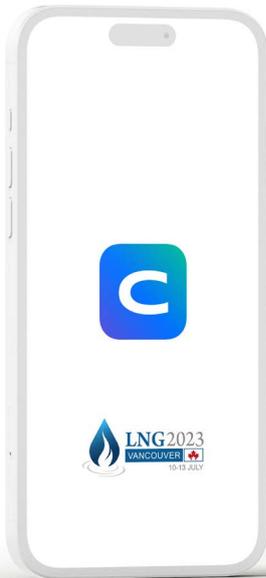
## LNG2023 EVENT APP

The LNG2023 Event App, bought to you by our Global Sponsors Cheniere and Tellurian, will be an essential tool to help you navigate the event.

The App contains the programme for the week, speaker profiles, all papers and posters, exhibition layout, exhibiting company profiles, networking functions details and so much more.

Use the official LNG2023 App to chat and schedule meetings with fellow attendees and industry experts.

## DOWNLOAD THE APP NOW!



## 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](mailto:info@lng2023.org).

Sponsored by:



# Monday's programme highlights

## Opening ceremony, acknowledgement of the traditional lands

Today LNG2023 will officially open and welcome you all to Vancouver and set the scene for the week ahead at Vancouver Convention Centre. Join us this morning:

**Date: Monday 10 July 2023**

**Time: 10:00 to 11:00**

**Location: East Exhibition Hall A**

If you haven't collected your badge, make sure to arrive early to collect your badge and attend the Opening Ceremony.

## Opening of the exhibition

The LNG2023 Exhibition will open its doors for the trade visitors and delegates today. All exhibition visitors will receive an exclusive access to this dynamic meeting place of conference delegates, policy makers, trade visitors and fellow exhibitors.

### EXHIBITION OPENING TIMES

Monday 10 July 2023	09:30 – 17:30
Tuesday 11 July 2023	09:30 – 17:30
Wednesday 12 July 2023	09:30 – 17:30
Thursday 13 July 2023	09:30 – 14:00

**Location: West Exhibition Level and Level 1**

## Welcome to Canada

We invite all LNG2023 attendees to join the Welcome Reception where we will showcase the best of Canada across the 4 seasons, featuring entertainment, and traditional food sponsored by 10 Canadian Sponsors. Don't miss this opportunity to network with fellow attendees and experience the unique charm and Canadian hospitality.

**Date: Monday 10 July 2023**

**Time: 18:00 to 19:30**

**Location: East Exhibition Hall A**

**Dress Code: Business**

Thank you to:



**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



**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 - 11:30  
LD.02 Leadership Dialogue  
with Crystal Smith, Chair,  
First Nations LNG Alliance;  
Chief Councillor, Haisla  
Nation
- 11:30 - 12:30  
PL.01 The Effect of  
Geopolitical Risk and  
Market Volatility on LNG  
Commercial Activity
- 12:30 - 13:45  
Networking Lunch
- 13:45 - 14:45  
**Spotlight Sessions**  
SL.03 Measuring Up...  
SL.01 Financing the Next...  
SL.02 Role in Europe's...  
SL.04 Innovation in LNG...
- 14:45 - 15:15  
Networking Break
- 15:15 - 16:45  
**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 - 10:30  
P.02 Challenges of a  
Turbulent Energy Transition
- 10:30 - 10:45  
Keynote Address  
Hon. M.P. Randy  
Boissonnault, Minister of  
Tourism & Associate Minister  
of Finance, Government of  
Canada
- 10:45 - 11:00  
LD.03 Leadership Dialogue  
with H.E. Saad Sherida  
al-Kaabi Minister of Energy,  
Qatar; President and CEO,  
QatarEnergy
- 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
- 09:00 - 09:15  
LD.04 Leadership  
Dialogue with Madam  
Li Yalan, President,  
International Gas Union
- 09:15 - 10:15  
PL.04 Growth of LNG  
through Innovative  
Partnerships and  
Cooperation
- 09:30  
Exhibition Open
- 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

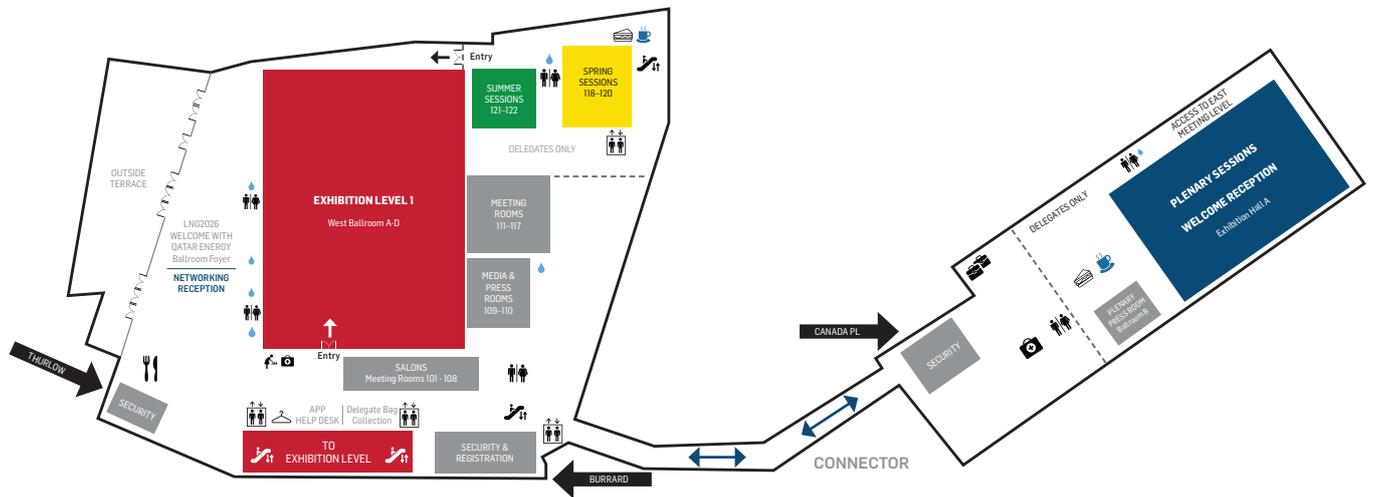
- 07:30 - 12:00  
REGISTRATION
- 07:30 - 08:00  
Networking Break
- 08:00 - 09:15  
PP.14 Innovation in  
Liquefaction...  
PP.15 Development in LNG...
- 09:15 - 10:15  
**Spotlight Sessions**  
SL.16 Small and Micro...  
SL.13 The Role of LNG...  
SL.15 Market and...  
SL.14 Progress in...
- 09:30  
Exhibition Open
- 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 - 12:30  
Keynote Address  
Hon. Danielle Smith,  
Premier of Alberta; Minister  
of Intergovernmental  
Relations, Government of  
Alberta
- 12:30 - 13:30  
PL.06 LNG2023  
Conclusions and  
Looking Towards LNG2026
- 13:30 - 14:00  
Closing Ceremony
- 14:00  
Lunch

# LNG2023 floorplan

**LEGEND:**

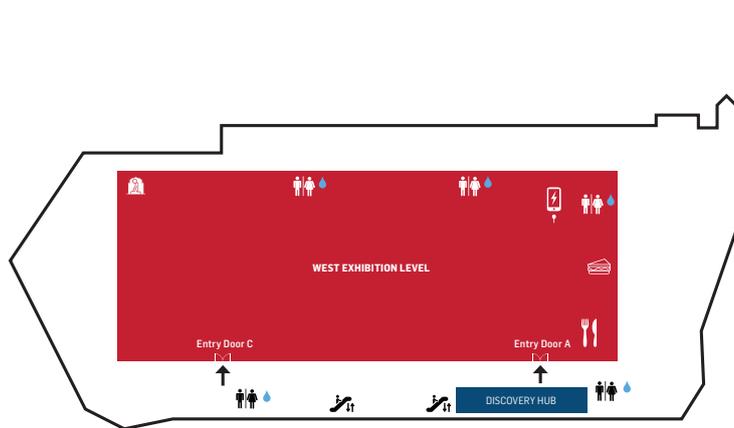
	<b>Water Fountains</b>	SPONSORED BY 
	<b>Bistro</b>	
	<b>Conference Delegate Networking Break</b>	SPONSORED BY 
	<b>Conference Delegate Networking Lunch</b>	
	<b>Cloakroom</b>	

	<b>Luggage Room</b> Open Thursday, 13 July only
	<b>Male &amp; Female Prayer Room</b>
	<b>Charging Station</b>
	<b>Mothers Room</b>
	<b>First Aid</b>
	<b>Toilet</b>
	<b>Lift</b>
	<b>Escalator</b>

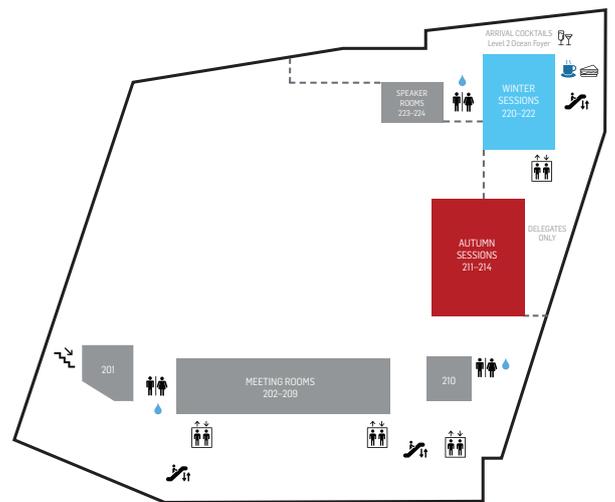


**WEST LEVEL 1**

**EAST LEVEL 1**



**WEST EXHIBITION LEVEL**



**WEST LEVEL 2**

# Sunday's highlights

## GTI ENERGY WORKSHOP

GTI Energy held a 4-hour workshop on Realizing a Carbon-Neutral LNG Value Chain. The training shared the overview of the current trends in technology development and applications at various points of today's global LNG value chain, including but not limited to modular liquefaction, boil-off gas management, new vessel design, utilization.

Split into the two sessions, the first session focused on what the industry is doing to further improve efficiency, enhance safety, and reduce cost. While the second session built on the value chain map laid out in the first session and illustrated the prevailing and emerging technology options and protocols to most effectively pinpoint, measure, verify, and reduce methane emissions from the LNG operations.



## ARRIVAL COCKTAILS

Yesterday evening was the perfect casual evening to kick off the LNG2023 experience. Attendees who arrived early in Vancouver started the week in style by connecting with other industry attendees while enjoying refreshments and the breath-taking view from the Vancouver Convention Centre terrace, overlooking the sea.

Here are some of the highlights of the Arrival Cocktails.

# Tomorrow's highlights

We dedicate the morning to the most pressing strategic opportunities and challenges faced by the LNG industry including a Leadership Dialogue session with H.E. Saad Sherida Al-Kaabi, the Minister of State for Energy Affairs, the President & CEO of QatarEnergy.

**Location: East Exhibition Hall A**

## DISCOVERY HUB LIVE

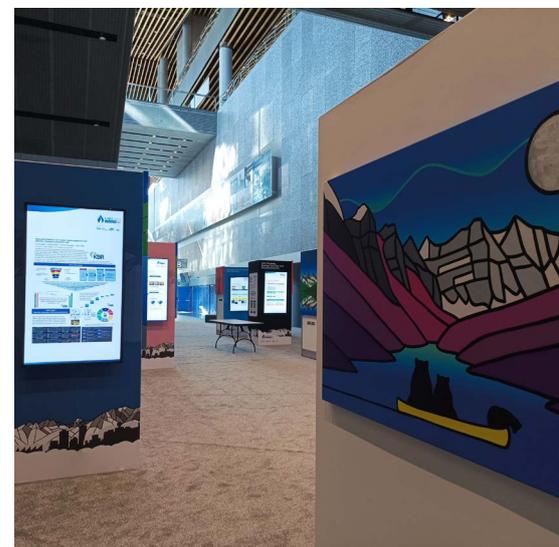
Interactive posters, presenting excellent but more specialised papers, will be displayed throughout the event and available to all LNG2023 delegates. Registered delegates will also have access to the written specialist paper behind each poster.

Wander around the interactive posters hall to discover new technology, new industry perspectives and results of in-depth research covering the entire LNG value chain. While the specialist papers authors can be contacted throughout the event to meet, ask questions and dive deeper into the topic presented, The Discovery Hub Live is a guaranteed rendezvous of additional opportunity.

**Time: 16.45 – 17.45**

**Location: West Exhibition Level 1**

You can also browse the Interactive Posters at <https://www.lng2023.org/discovery-hub>



# Around Vancouver

Vancouver is a vibrant cosmopolitan city surrounded by incredible nature and known for its diverse culinary scene. There are numerous fantastic places to eat in Vancouver, offering a wide range of cuisines to satisfy every palate. Here are some popular and highly regarded dining establishments:



## 1. HAWKSWORTH RESTAURANT:

This upscale restaurant offers a sophisticated dining experience with a menu highlighting contemporary Canadian cuisine.

801 West Georgia Street  
V6C 1P7

[hawksworthrestaurant.com](http://hawksworthrestaurant.com)

## 2. VIJ'S:

Known for its Indian fusion cuisine, Vij's is a renowned restaurant that combines traditional Indian flavours with modern techniques.

3106 Cambie St  
V5Z 2W2

[vijs.ca](http://vijs.ca)

## 3. MIKU:

If you're a fan of Japanese cuisine, Miku is a must-visit. They specialize in aburi sushi, which features flame-seared sushi that creates a unique and delicious taste.

200 Granville St #70  
V6C 1S4

[mikurestaurant.com](http://mikurestaurant.com)

## 4. NIGHTINGALE:

Located in the heart of downtown Vancouver, Nightingale offers a modern and vibrant dining experience with a menu focusing on local ingredients and wood-fired dishes.

1017 W Hastings St  
V6E 0C4

[hawknightingale.com](http://hawknightingale.com)

## 5. ANNALENA:

This trendy restaurant serves innovative and modern Canadian cuisine. The menu features creative combinations and beautifully presented dishes.

1809 W 1st Ave  
V6J 5B8

[annalena.ca](http://annalena.ca)

## 6. BAO BEI CHINESE BRASSERIE:

Offering a contemporary twist on traditional Chinese dishes, Bao Bei is a popular spot for small plates, cocktails, and a lively atmosphere.

163 Keefer St  
V6A 1X4

[bao-bei.ca](http://bao-bei.ca)

## 7. SAVIO VOLPE:

This Italian restaurant in the Fraserhood neighbourhood is known for its rustic and authentic cuisine. They serve wood-fired dishes, homemade pastas, and delicious desserts.

615 Kingsway  
V5T 3K5

[saviovolpe.com](http://saviovolpe.com)

## 8. CARDERO'S:

Enjoy the casual, upscale menu with offerings of freshly grilled fish or items from the wood burning while enjoying the spectacular mountain and inlet views.

1583 Coal Harbour Quay  
V6G 3E7

[www.vancouverdine.com/carderos/](http://www.vancouverdine.com/carderos/)

## 9. ASK FOR LUIGI:

This cosy Italian eatery in Railtown is celebrated for its homemade pasta dishes, fresh ingredients, and warm ambiance.

305 Alexander St  
V6A 1C4

[askforluigi.com](http://askforluigi.com)

## 10. TACOFINO:

Originally a food truck, Tacofino has expanded to several locations and is renowned for its delicious tacos and fusion-inspired Mexican cuisine.

Various Locations

[tacofino.com](http://tacofino.com)

Remember, this is just a small selection, and Vancouver has many more excellent restaurants to explore. It's always a good idea to check recent reviews and recommendations to ensure you're getting the most up-to-date information on the best places to eat in the city.

# 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](mailto: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:**



## 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.



## 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 [marketing@lng2023.org](mailto:marketing@lng2023.org).



## 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**



Mike Rose, CEO, Tourmaline Oil

# In Conversation: Mike Rose, CEO, Tourmaline Oil



Tim Egan, CEO, Canadian Gas Association

**Tourmaline Oil is Canada's largest natural gas producer, and a leader in employing technology and innovation to produce ever cleaner natural gas. Recently, CEO Mike Rose sat down with Tim Egan, CEO of the Canadian Gas Association, to discuss Tourmaline's past, present and future, Canada's road to net zero, and how to navigate that path.**

**Tim Egan: Mike, we want to talk about innovation and Tourmaline's innovation story, so I thought why don't we start with you giving us a bit of a snapshot on Tourmaline, how it came about and how you built the company to what it is today?**

Mike Rose: Well, I'm a geologist. I started 44 years ago in this business and when I started at Shell in 1979, I was actually told that this might be a sunset industry. The sun is still shining brightly and will for many more decades. I worked at Shell for 14 years in exploration and production; the last job I had was running E&P research for Shell Canada with significant interaction with the entire Shell group. I was always a technical, detail-oriented geologist, a good playmaker, but that research exposure really opened my eyes to the power of technology and research and that's helped me to this day. I left Shell in 1993 as I had an opportunity to go the independent route and start Berkley Petroleum, which we grew to an Intermediate E&P until March 2001, when it was

sold to Anadarko. I started Duvernay Oil immediately after that as a private company, went public, and also grew to Intermediate size. We were a pioneer of the Montney play and Shell bought Duvernay in July of 2008 – the last time, ironically, that we had \$8 gas, for \$5.5bn.

That was when I started Tourmaline, in the summer of 2008, during the major financial crisis. We were in a good position because we were well capitalised coming out of the Duvernay transaction and it was one of the rare times that the very large companies and the majors would part with premium assets in the best part of the Basin – the two premium Canadian gas plays – the Alberta Deep Basin and BC Montney. Tourmaline went public in 2010 and we've grown from there. We're now the largest natural gas producer in the country as well as the largest natural gas liquid producer – fourth largest producer overall. Importantly, we have by far the largest future drilling inventory of any of the North American large gas producers. The long-term goal is to control the largest

lowest-development-cost, lowest-emission natural gas supply in North America; we're well on the way.

**Tim Egan: So let's go down that path a little bit, your goal to be the lowest-emitting producer. Often in the present conversation there seems to be a conflict between the shareholders' interest and the environmental agenda. How do you reconcile those two?**

Mike Rose: I think our shareholders are very happy with what we're doing on that front. The ones that have invested in us obviously like natural gas. They realise that of the fossil fuel group, natural gas has the highest energy density and the lowest emissions when you burn it. We're certainly not hiding or afraid of the fact that we do create emissions, but we work very hard at reducing those emissions across the whole production chain. I think we're a leader in that regard, and that makes shareholders happy as well. That's what this company is, and we plan to be, on a net basis, the lowest-emission producer in Canada, →

and Canada, we believe, leads the world in that regard.

**Tim Egan: How do you measure that as a producer? Is there a straight-up simple measure? Is there a means to do it?**

Mike Rose: Yes, everybody's reporting now, any company of size, and so you have to report your total CO<sub>2</sub> emissions and your emission intensity, as well as methane emissions. I think it's gotten pretty sophisticated. Measurement is continually evolving in the field, with standardised measurement protocols being finalised. I'm not the expert in that, I'm just good at finding the stuff, but we have really talented people who manage this aspect of the business.

**Tim Egan: You're now recognised in Canada as being the lowest-emissions producer. Do you feel that falls on deaf ears with decision makers in this country?**

Mike Rose: To a large extent yes, as we are working very hard on emissions reduction and making material progress, and it is frustrating.

**Tim Egan: You make a point in your corporate reporting to talk about GHG emissions, but a lot of people seem just fixated on that when they talk**

**about the environment, and you have a much broader take on environmental performance. You talk about air quality in general, water and surface impact as well. Do you want to talk about that a little bit?**

Mike Rose: Sure. Our mantra is full environmental performance improvement for air, land and water. Man is certainly polluting all three as our overall population grows, and we want to improve our performance in all three areas. We need as much fresh water as possible around the world, hence we've systematically eliminated fresh water usage from virtually all of our fracking operations. And we're also a leader in the basin in diesel displacement, getting our drilling rigs and frack spreads off diesel onto our own natural gas. That leads to material emissions reductions, and not just CO<sub>2</sub>, but all the other more noxious emissions that are released when you burn diesel. We also have a whole CCUS strategy on the gas side of the business that we will enact.

How we approach our environmental performance improvement is to lay out five-year plans on improving our performance in all three areas, similar to our EP/Financial plans, which we've produced for a long time. We set hard targets in those five-year environmental plans, and we have a perceived technology roadmap to get there. When

we get to the end of the five-year plan or achieve the targets early, we set a new five-year plan and put new hard, challenging targets in place. We're now in our second five-year plan on overall environmental performance improvement. Notably, on methane emission reduction, we hit that target three years early, and we have subsequent targets that we're evolving and we'll continue down that path. Importantly, that's not methane intensity reduction, that's a 25% reduction in net methane emissions, three years early, and we're probably the fastest-growing producer in the basin.

**Tim Egan: So that kind of environmental performance is about technology. Do you want to talk a little bit about your perspective on technology and where you want your company to be on innovation technology?**

Mike Rose: We approach all aspects of the business with a very strong scientific and technology focused lens, as well as a very strong economic lens. And really, all our decisions are made that way. We deliver the lowest capital cost completed horizontals in our two main gas areas, the Montney and the Deep Basin. We have brand new state-of-the-art infrastructure that we've constructed; we're actually the fourth largest gas midstreamer in the basin. →



A natural gas plant in the Montney basin, Canada



The emissions testing centre at Tourmaline-Perpetual Energy West Wolf gas plant.

Brand new, low emission, and super efficient; we're at the leading edge, technology-wise, in all of these areas. When we're talking about environmental performance improvement, we have that same lens. I talked about our diesel displacement and I think we are the first company to get our whole drilling fleet off diesel. That has also saved us \$60 million on a net basis over the past three years. You can improve financial performance as well as environmental performance. If there is an opportunity to achieve a positive return from this important environmental performance improvement, then shareholders get a double win – they get a cleaner environment, and they get a more profitable underlying company.

**Tim Egan: So when you think about technology innovation in environmental performance, you noted that a key part of your motivation is delivering best value to shareholders to drive your cost down. Do you also think of these technologies as new innovations that you might then patent or develop and carry into the market for use by others out there? Because it seems to me that this kind of innovation is in itself a huge value to others out there in the market.**

Mike Rose: We are in the Natural Gas Innovation Fund, which is about sharing technologies, and we're all over that because not only do we want Tourmaline to be the best company out there, but our whole sector needs to be getting cleaner, for all the macro issues that we're continually dealing with. Technology and its innovation application is the answer. We all agree that we need a comprehensive integrated energy and environment strategy that balances improving the environment and reducing emissions while considering the economic well-being of the country, its individual citizens and providing energy security for all. And you can't do that in isolation. Technology and innovation will drive environmental performance improvement. It won't necessarily happen on arbitrary timelines like 2030 or 2050, but it will happen. It's science and technology and innovation that will provide the real answers on our environment.

**Tim Egan: The public conversation about what needs to happen on energy is that there needs to be this kind of dramatic transition, but as you describe the kinds of things you do, it's steady, continuous improvement. It's incremental change, it's setting**

**short-term goals internally as a company and building on them. Is there a disconnect between the sort of high-level government objectives and this idea of a transition and what companies actually do on the ground?**

Mike Rose: Yes, I think there is. And it's mostly because the targets that have been set are arbitrary, as are the timelines, and a top down approach in just about anything doesn't work. It needs to be systematically and collaboratively built from the ground up, and we're on the ground now and we're building from the ground up and that's what will actually accomplish something meaningful in the end.

We all need to work together to develop that comprehensive plan. And as I said, you can't do one in isolation, which is pretty much how the approach has been. The world needs more of all forms of energy. We prefer the term transformation to transition, particularly when you talk about oil and gas, because transition suggests it's going away, but we don't think it's going away at all. In fact, oil and gas demand is increasing and has been for some time and will continue to; we will all work in the entire energy industry to reduce emissions and improve our collective →

environmental performance.

We believe natural gas is the key right now to the energy transformation.

We think of it as the great enabler. It's affordable, it's reliable, it's abundant, and if you live outside more than 20 degrees either side of the equator, it's essential for life as well. We just need a pragmatic, scientific, economic approach to this file. If you look at some of the cost estimates on the world's energy transition, if we did get completely off fossil fuels, some of the numbers being tossed around are in the range of \$150 trillion. In the Shale Revolution in the US between 2010 and 2020 – the total capital expenditure was \$1.3 trillion and that was a technical revolution. We really did figure out how to create an enormous amount of abundant low-cost energy; we just ironically killed our own supply-demand equation. That's \$1.3 trillion between 2010 and 2020, but to completely get off fossil fuels the think tanks are saying \$150 trillion. And we don't have a plan on how to actually accomplish this, and neither does the United States and neither do any of the Western governments.

**Tim Egan: But to your point, why would you try to get off? I mean, the reality is that every source of energy we've ever used, we continue to use, and in fact use more of than we ever have before. Use more wood than we ever did, more coal than we ever did, more oil than we ever did. But we're using them better.**

Mike Rose: And we're making them better. I think all of our energy choices should be made on an energy equivalent, full-cycle basis, comparing the true cost per unit of energy delivered, and the true, full-cycle environmental impact and emissions footprint of each of those sources. And when you do that natural gas actually screens at or near the top. But in reality, we don't have the luxury to pick one or two sources – we need more of everything.

Now there are some in power in the various Western nations who are trying to arbitrarily accelerate this transition off fossil fuels to 2030 or 2035. It's an incredibly risky path and will materially change the entire world economy and compromise the standard of living of all Canadians starting by impacting the most disadvantaged.

## Fortunately, our country has a second chance at this as natural gas evolves into a truly global commodity. The Great Enabler!

*Mike Rose, CEO, Tourmaline Oil.*

**Tim Egan: You note that any kind of change really comes about from the ground up. When it's pursued from the top down, it doesn't go well. What do we do as an industry to make that clearer to decision makers, so that that reality is better realised and we can capitalise on the opportunity we have?**

Mike Rose: First, we go out in the field, on the ground, and demonstrate how it can be done! We need to do as good a job as possible of making sure the Canadian population understands the entire energy/environment equation and what we require, and that we can't just stop using fossil fuels tomorrow, but we do need to get ever cleaner with them. Better energy literacy for all Canadians would go a long way in helping to shape a regulatory environment that reflects that whole equation.

**Tim Egan: Part of the challenge is to attract younger Canadians to the sector, to see the sector as being innovative and cutting edge. Do you have any suggestions on what we can do to attract more people into the sector and to play up the innovation stories that we have within?**

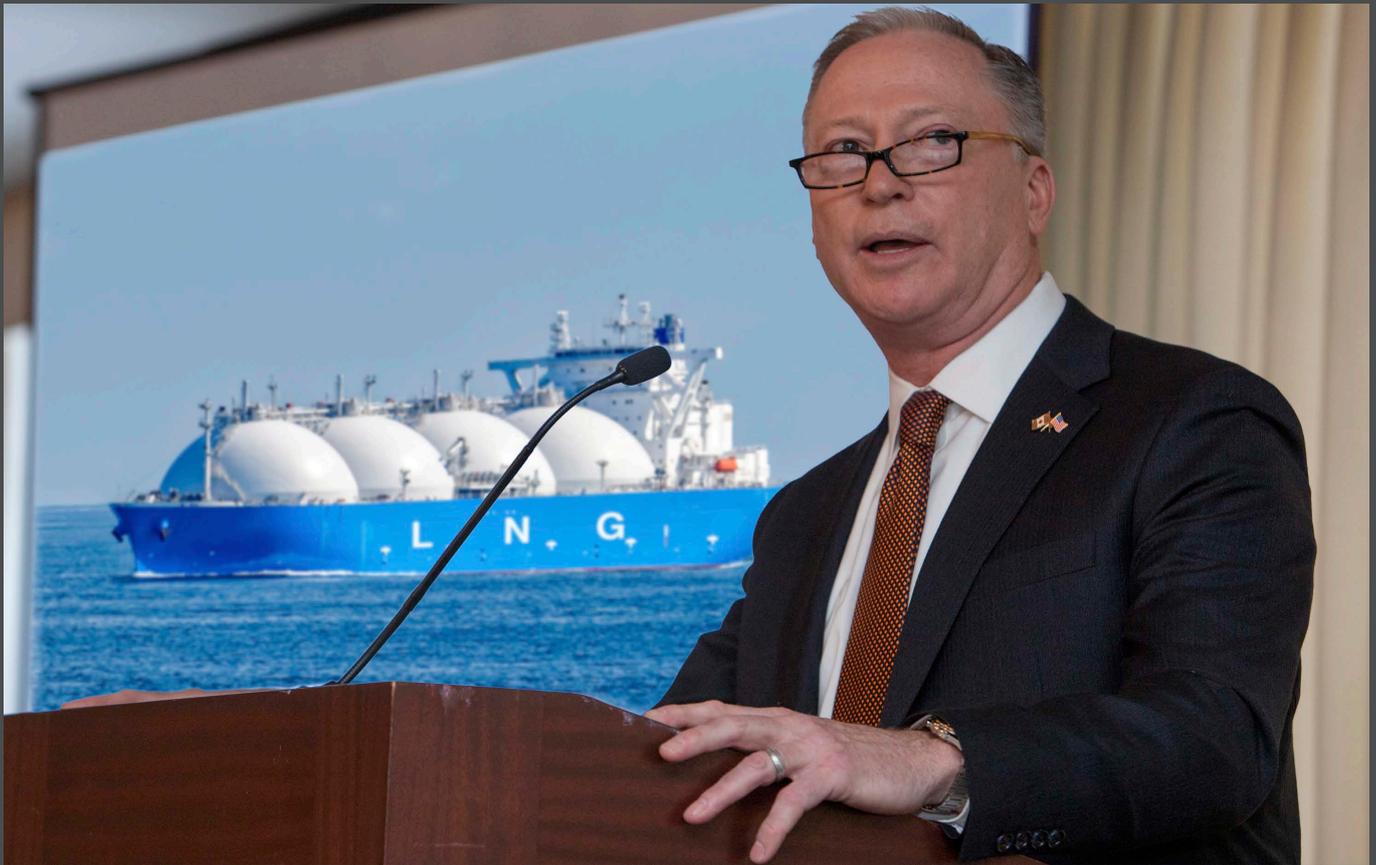
Mike Rose: I think we have to keep communicating. We have to do a better job of elucidating how a career in oil and gas is not only exciting, fulfilling and all those things you want from a great job, but an excellent way to drive the type of innovation that can make a huge difference in the world. We also need the public and the government better educated on what we do, and that's on us as well. And I think we need to somehow encourage a more balanced media to deal with, as well, because they play a big role in shaping the issue.

**Tim Egan: There's a terrible moment in world history right now. Russia has invaded Ukraine. There are monstrous things happening on the ground there. It's forced Europe to reflect on its energy picture, it's forced the world to**

**talk about energy security in a way it hasn't for a very long time. Is this an occasion for Canada to step up? And if so, what more can we do to step up?**

Mike Rose: I think yes, is the answer to that question. Can we provide more natural gas to Europe in the immediate short term? No. Can we supply a little bit more gas south to the United States and then in effect, displace some gas that might have been going to Asia and get it to Europe? Yes, we can, and we are. In January 2023, Tourmaline became the first Canadian natural gas producer to supply LNG internationally through our US Gulf Coast LNG venture. What we actually don't really need from our governments, provincial and federal is money, particularly on the gas side; we don't need to be subsidised. We just need consistent regulatory support for the approvals and doing it quickly, so that we can build more pipelines, because that is the key to providing clean, low-cost Canadian energy to the world. Canada will have an LNG industry on the West Coast when LNG Canada starts up in 2025 or 2026. It's currently slated at 2bn ft<sup>3</sup>/day; it will hopefully grow to 4bn ft<sup>3</sup>/day, but ideally we should build another LNG project or two. North America can be completely energy independent and 'Energy Secure' – it is certainly on the gas side now. The 12bn ft<sup>3</sup>/day LNG export business that has emerged on the US Gulf Coast in the past three years could have been on Canada's West Coast if we'd moved more decisively in the 2010 – 2015 time period. Fortunately, our country has a second chance at this as natural gas evolves into a truly global commodity. The Great Enabler! 🇨🇦

*This article was originally published on [Gas Pathways](#), an international platform demonstrating the innovation agenda around gas energy and gas energy infrastructure. The BOE Report is a Gas Pathways Partner.*



*Greg Ebel, President and CEO, Enbridge*

# The global cost of Canada's complacency

**Canada has a monumental opportunity to help the world, if only we can think beyond our own backyard when it comes to energy and climate.**

***Greg Ebel, President and Chief Executive Officer, Enbridge***

When global allies have come knocking on Canada's door seeking secure sources of energy – specifically, exports of responsibly produced natural gas – our response has been typically Canadian:

“Sorry.”

Last year, Germany — and more recently Japan in trade discussions in line with Canada's Indo-Pacific Strategy — made it known that access to Canadian energy was among its top priorities.

Yet no deals were struck.

While export facilities for liquefied natural gas (LNG) do take time to build, getting the ball rolling did not appear to be part of the conversation when Germany and Japan asked for our help.

But it is not too late to ensure that we do not turn away our allies again. There are viable commercial proposals being pursued for LNG projects on both the East and West coast of Canada. We must do everything we

can to get them built.

The world recognises the value of Canada's vast natural resources and the impact those resources can have for energy security, reliability — and importantly — reducing global emissions.

And the Canadian public get it, too. A poll in March found that more than two-thirds of Canadians think Canada should make a greater effort to export our energy.<sup>[1]</sup>

This month, Canada plays host to

[1]: Poll: Majority of Canadians Agree - The World Needs More Canadian Energy ([newswire.ca](https://www.newswire.ca))



Rendering of the Woodfibre LNG project, in Squamish, BC – the facility has a tangible plan to achieve net zero emissions by the time operations start in 2027.

LNG2023 — a global gathering focused on LNG that brings the world to us. It's an incredible opportunity to showcase the innovative ways Canadian companies, Indigenous peoples and governments are coming together to lead in sustainable energy development and secure a cleaner energy future.

Our message needs to be clear: Canada is ready to take action and provide a global solution.

Canada has 1,373 trillion cubic feet of natural gas resources available for production<sup>[2]</sup> — enough to power British Columbia for centuries. With our nation's environmental policies, Canadian natural gas is some of the lowest emission, most sustainably produced in the world.

Natural gas is a reliable, affordable, lower-carbon ready-now fuel source. It can significantly reduce global emissions by displacing coal (which today generates 40% of the world's electricity and produces roughly double the emissions of natural gas) and supporting renewables, which requires a back-up fuel source because the sun isn't always shining and the wind is not always blowing.

Demand for natural gas is growing — particularly in Asia Pacific where it's forecast to increase nearly 30% by 2050<sup>[3]</sup>. Bringing more Canadian LNG to global markets will support energy security and lower energy prices, which helps everyone.

Our allies share Canada's climate ambitions — we're all working to achieve net zero. Both Germany and Japan see a role for reliable natural gas as part of the equation. So should Canada.

Canada also needs to be less myopic when it comes to energy security and fighting climate change. As global citizens, we need to think more broadly about how we can help reduce the 98.5% of emissions produced beyond our borders. There's a success story just south of us: in the last 15 years, switching from coal to natural gas in the U.S. has accounted for nearly two-thirds of all U.S. greenhouse gas emissions reductions. This formula can and should be replicated in the rest of the world — and Canadian LNG can make it happen.

We also can't overlook that there are over 700 million people in the developing world with no access to electricity. Connecting them to reliable energy could lift millions from poverty and drive economic growth. Canadian LNG should be helping here, too.

Here at home, natural gas and Canadian LNG also offer a real opportunity to make meaningful progress on Indigenous reconciliation.

Many Indigenous groups have natural resources they want to develop to make a future for themselves and provide wealth for generations to come. The energy industry has an opportunity (in fact, I feel an obligation) to help them become full economic partners.

At Enbridge, we've seen first-hand how important equity partnerships are in empowering Indigenous communities' long-term financial stability and providing revenue sources to invest in their future.

However, Indigenous groups too often struggle to access capital, which is why a national Indigenous loan guarantee program is so needed. There are already successful loan guarantee programs at the provincial level in Alberta, Saskatchewan and Ontario that can be used as a model, but to truly take advantage of the opportunity a national program is essential.

So how do we as a country stop being complacent and start taking action?

There's clearly more Canada can and should do with our vast natural gas resources. My ask is that our allies continue to come knocking, to push us to think beyond our own backyard.

Let's embrace the role our natural gas can play and not hide from it: for energy security, for energy reliability and for global emissions reductions. Let's create reasonable permitting processes that enable its responsible development across jurisdictions. And let's develop a national Indigenous loan guarantee program to ensure our Indigenous neighbours have a seat at the table.

When it comes to Canadian natural gas and exporting LNG let's stop saying we're sorry and start saying you're welcome.

This content was provided by Enbridge. The publishers accept no responsibility for the opinions expressed.

[2]: [https://natural-resources.canada.ca/sites/nrcan/files/energy/energy\\_fact/2021-2022/PDF/2021\\_Energy-factbook\\_december23\\_EN\\_accessible.pdf](https://natural-resources.canada.ca/sites/nrcan/files/energy/energy_fact/2021-2022/PDF/2021_Energy-factbook_december23_EN_accessible.pdf)

[3]: [Canada's LNG Opportunity: A Value Proposition Worth Celebrating | Energy for a Secure Future \(energysecurefuture.ca\)](#)

**Joseph  
Murphy**



*Didier Holleaux, vice president of Engie and the president of the Eurogas association*

# Europe's energy crisis is far from over

**Didier Holleaux, vice president of Engie and the president of the Eurogas association, warns that Europe faces several more potentially tough winters in terms of gas supply security, and urges policymakers to avoid complacency.**

Europe got through last winter avoiding energy shortages and the sharp decline in natural gas prices over the past six months has provided a welcome reprieve for consumers. But the continent's energy crisis is far from over, Didier Holleaux, president of the Eurogas association and vice-president of France's Engie, tells *NGW*, warning that risks will remain over the next four winters and authorities must avoid complacency.

The front-month gas contract at the Dutch TTF hub is currently trading at €30-40/MWh. This is a far cry from the peak of €340/MWh that was seen in August 2022, following a drastic cut in Russian pipeline gas supply over the summer.

EU authorities have taken steps to bring down gas prices over the past year, although Holleaux believes the 2022 prices and an unusually mild winter, rather than policy, are largely to thank for relatively low prices now. And he also stresses that current prices are still significantly higher than what was considered normal in the years prior to the COVID-19 pandemic.

"The main factor in rebalancing the market in Europe has been very high prices," he tells *NGW*. "That attracted all available LNG globally, but also significantly reduced industrial demand. And then there was the mild winter."

The European Commission's enforcing of gas storage requirements ahead of last winter also played a role, he says. The EU executive introduced a bloc-wide obligation of 90% gas storage utilisation by November 1, 2022, and this target was far-surpassed, with the level reaching nearly 95%.

Though "helpful," the EU storage rules were so rigid that at times this triggered price spikes, he adds.

The European Commission recently hailed the first tender of its newly-launched joint purchase platform for acquiring gas ahead of the next winter as a "remarkable success." According to media reports, buyers placed orders for 11.6bn m<sup>3</sup> of gas, while suppliers offered 13.4bn m<sup>3</sup>.

However, Holleaux cautions that it is still too soon to say whether the platform can be considered successful.

"So far buyers and sellers have only been matched up. They still have to negotiate and come to an agreement. It's like speed dating - it's good that people turned up, but unless they leave the room with a

decision to meet again, we don't know what the success is."

He also notes that given that a lot of the gas was requested on the network rather than at the LNG terminals, much of the volume bid for was remarketed rather than marketed.

"That means that it was gas that had already been dedicated to Europe and remarketed, rather than new gas supply," he says.

"It means that only 20-25% maximum of the gas bought is really new gas coming to Europe," he says. "That's why we consider the success modest. But in a crisis, every bn m<sup>3</sup> of gas counts."

He also praised the joint purchase platform for enabling smaller market players to participate on a level playing field with larger players.

The view of Eurogas, Holleaux says, is also that the TTF price cap that the EU introduced after the August 2022 spike in prices was set so high and so late in the season that it had no impact on the market. But a lot of market players consider it was designed poorly, and therefore it would have been inefficient or even had an adverse impact on the market if triggered.

He also regrets that natural gas was only included in the EU taxonomy of what should be considered as "transition investments" with such restrictive conditions that very few projects such as gas-fired power plants can be included.

## Unrealistic forecasts

Holleaux also points to mixed messages in the bloc's energy forecasting, which has hindered the signing of longer-term contracts for new gas supply. In its RepowerEU working document released last year, the European Commission projected that bloc gas demand would fall to only 135bn m<sup>3</sup> of gas by the end of the decade, and Holleaux stressed that this forecast should be revised.

"If you believe this figure, then you don't need any new contracts and you don't even need to find replacements for the missing Russian gas," he says.

The key focus should be facilitating buyers signing new long-term contracts. In the wake of Russia's invasion of Ukraine last year, the European Commission reached a deal with Washington on

securing an additional 50bn m<sup>3</sup> of US LNG. But Holleaux believes little in practice has been done to achieve such goals, describing the deal as "not yet materialized."

The majority of long-term LNG contracts helping to underpin investment in new supply have been mostly with Asian buyers or large LNG portfolio companies. Holleaux notes that for example there are only two projects in the US set to reach a final investment decision mostly as a result of European contracts - Port Arthur Phase 1 and Rio Grande LNG.

"The commission has not taken any concrete steps to help European companies reach those long-term contracts, and it's also a problem with national governments," he says.

He adds that the joint gas purchase platform could have also been focused in part on attracting longer-term gas supply.

The lofty vision for a downsized role for natural gas in the European energy mix in RepowerEU partly relied on targets for a significant expansion in the use of renewables and the production of biogas and later hydrogen. Holleaux views the forecast for biogas production - 35bn m<sup>3</sup> by 2030 - as "absolutely achievable." But he is less confident about the projections for hydrogen output - 10mn metric tons produced domestically and an equal amount imported by the end of the decade.

"Some of these targets are overambitious - they cannot be achieved within this timeframe," he says.

All told, Holleaux warns that the energy, and particularly gas crisis, for Europe, is far from over, and the risk of high prices and potentially shortages will persist for at least the next four winters. That is until the next wave of global LNG supply arrives, from projects such as Qatar's North Field East project. Cold weather this coming winter, coupled with high Asian demand, could spell serious problems, he warns.

"We are out of winter and the price of gas on the spot market started to go down, so politicians seem to believe that the crisis is over," he says. "No, the crisis is not over, and the next four winters are still high-risk winters. And the current price is still very high compared with the average price of previous decades, and this is a big challenge for European industry, which is competing with other industry in other parts of the world." 🌍

**Joseph  
Murphy**



*Martin Mayer, Vice President, LNG at McDermott*

# The case for e-drives

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**Martin Mayer, Vice President, LNG at McDermott, discusses the energy trilemma, the role of LNG and how the increased adoption of e-drives with continuing innovation is making a mark on emissions.**



### What is your view on the energy trilemma? In a time of volatile and high energy prices, how can we balance energy security and affordability with sustainability?

We understand the Energy Trilemma is the need to find balance between energy reliability, affordability, and sustainability and its impact on everyday lives. If we address the prime sources of energy, i.e., oil, coal, piped gas, LNG, renewables and nuclear, none can satisfy all three criteria. Renewable energy is clearly best-in-class with respect to sustainability. Although, one must not omit the lifecycle footprint through the renewable value chain, i.e., from raw material extraction through to production and operation. Renewable energy is affordable and increasingly so. But currently, it cannot meet the world energy demands and still needs major investment and scale up of infrastructure to improve the reliability and consistency in supply.

In the short- to medium-term, it is necessary to provide both energy security and affordability through non-renewable sources, notwithstanding public objection to using hydrocarbons (and/or nuclear).

Energy supply from hydrocarbons is affordable and reliable, but has higher emissions throughout its value chain, particularly in the transportation sector. There are many opportunities to abate these emissions, but these techniques come at a cost, particularly for energy provided through coal or oil.

Piped gas and by inference LNG, is affordable, and have relatively lower emissions than coal and oil, with opportunities for further abatement. As such, natural gas and LNG are well positioned to be the energy source of choice in the short- to medium-term, to satisfy the shortfall from renewable sources.

Natural gas and LNG provide proven and cost-effective solutions to energy security, can displace some of the energy

supply of higher-emission sources--replacement of coal in power stations for example – and can provide the security of energy supply that is necessary as emerging technologies, together with the renewables industry, strive to meet the world's energy demand.

### What role does LNG have on the road to net zero, and how can LNG best maintain its social licence to operate?

Natural gas and LNG can contribute in a significant way to the reduction of emissions in the energy industry in the near term. Use of natural gas is constrained by its availability in areas of high energy demand and by constraints in infrastructure to move the gas in sufficient quantities to the end user. In these instances, LNG provides a valuable opportunity to support an increase in use of natural gas, which can then be utilised to displace higher emitting fuel sources, such as use of coal for power generation.

Additionally, LNG has a high energy content per unit volume and can be stored in large quantities. Therefore, it provides an ideal way to provide energy security and reliability, and enable supply of energy at peak demands, whether diurnal or annual. Importantly, LNG can also provide much needed energy security for events, whether geopolitical or climatic, that are outside the control of a natural gas consuming nation.

Use of natural gas, and by inference LNG, generates higher emissions than renewable sources of energy. Therefore, to maintain support for LNG, there is a necessity to show pathways to reduce emissions and implement emission reduction technologies on new and existing natural gas and LNG facilities. Many emission reduction concepts can be implemented at a relatively low cost, particularly if combined with use of renewable energy, but others do incur an

increase in cost, such as sequestration of the CO<sub>2</sub> that is already captured as part of the processing of the natural gas or LNG and then generally emitted.

### We've seen increased adoption of e-drives as a low-carbon power solution for LNG facilities. How significant an impact do they have on emissions versus gas turbines and what do they add in terms of extra cost?

The use of e-drive as a low-carbon power solution for LNG facilities must be considered with both Scope 1 and Scope 2 emissions in mind: emissions associated with the operation of the LNG facility (Scope 1); and the emissions associated with the generation of the power that supplies the LNG facility (Scope 2).

A good example of a low-carbon solution is the Woodfibre LNG project where the imported power to the LNG facility is primarily from a renewable source, in this case hydroelectric. It would be unrealistic to categorise an e-drive LNG plant as low carbon if the power to drive the facility is sourced from an open cycle or coal fired power plant. Power sourced from a natural gas fired combined cycle power plant has some potential to enable a lower carbon LNG facility but this improvement in emissions can be negated, if not completely lost, due to the process heating requirements of an LNG facility.

By using e-drive in conjunction with renewable power, the GHG emissions could be reduced by 80%-90% when compared to a traditional industrial gas turbine driver configuration utilised by most of the world's LNG facilities. When considering auxiliary systems required to operate gas turbines and e-drive compressors, the cost difference between the two solutions is not significant although the cost of power supplied through renewable sources is transferred from a capital cost to an operating cost.

### What kind of innovations are we seeing regarding e-drives and what is the potential for those innovations to drive down costs?

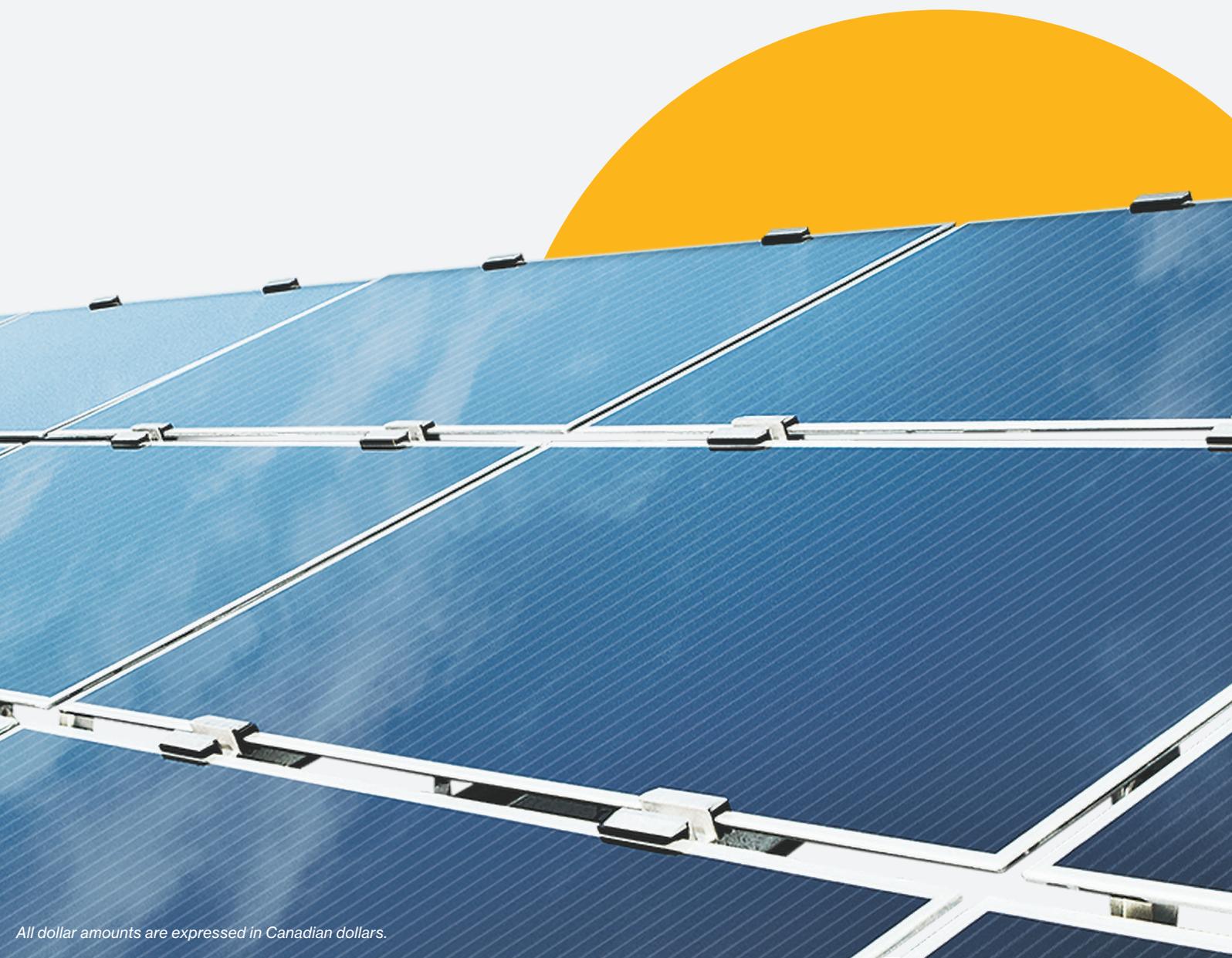
One of the innovations we are seeing with e-drives is the development of an increasingly standard and modular design approach to the liquefaction and refrigeration units of an LNG facility. This should provide an opportunity to drive down cost and result in a reduced testing program and shorter delivery times. 🌟

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**Joseph Murphy &  
Dale Lunan**



*Tellurian Energy CEO Octavio Simoes*

# Global gas challenges a function of under-investment

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**Chronic underinvestment in new supply has led to the energy crisis we are contending with now, says Tellurian Energy CEO Octavio Simoes.**

Challenges facing the global natural gas industry today are not merely a product of recent price volatility – especially in Europe and particularly since Russia’s invasion of Ukraine – but of chronic underinvestment in new supply, says the CEO of US natural gas company and LNG hopeful Tellurian Energy, Octavio Simoes.

“I think that if you look fundamentally at what the challenges are, they stem from the fact that since 2014, we have cut down almost in half the annual investment in the oil and gas sector,” he told NGW in an interview ahead of LNG2023.

In an effort to achieve Paris Agreement goals, economies around the world have turned away from fossil fuels to focus on electricity – and new, greener ways of generating electricity – without really remembering how embedded oil and gas is in global economies.

“People tend to focus only on electricity production, which is only 25%, without realising how important oil and gas is in areas like fertilisers and production of steel and concrete and other processes and materials,” he said.

In the months leading up to Russia’s invasion of Ukraine in February 2022, and certainly in the months since, global attention has shifted from environmental concerns to worries about supply security. Germany has become the poster child for this energy trilemma: in a rush to burnish its environmental image, Germany closed coal-fired generating plants and nuclear facilities, and pivoted directly to renewables to meet its needs.

But that over-ambitious reliance on wind and solar failed miserably, and in an environment of supply shortages when gas from Russia disappeared, Germany found itself ramping up LNG import capabilities and re-starting some coal-fired power plants.

But Germany was not alone in the scramble to secure energy, at whatever cost financially or environmentally, Simoes said. LNG was diverted to Europe at the expense of Bangladesh going dark, Pakistan abandoned gas to go back to coal and other Southeast Asia economies were left to seriously consider whether they could really invest in natural gas and decarbonisation.

“So when we look at the statistics, the goals of decarbonisation are not only not being met, they are actually being made worse, because 2021 emissions were the highest, emissions in 2022 were higher than 2021 and 2023 is going to be more than 2022,” Simoes said.

In a climate for increasing demand, he said, the LNG sector is also left with challenges to attract financing to build new capacity – a result of the price volatility. The ages-old financing model, based on 100% capacity factors and fixed fee for liquefaction, no longer works, because rising costs have pushed the fixed fee much higher than what the market is willing to pay, and projects can’t get financed.

“And I don’t just say bank financing, I also mean equity financing. Equity requires a return and the banks maybe get comfortable with certain coverages, but then there’s no equity,” Simoes said. “We have several different cases in the market that show that some projects have gone ahead where there is zero return on equity and that’s just not a viable model going forward.” 🔥



Graphic drawing depicting the Driftwood LNG project. Source: Tellurian Energy.

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