ASIA GAS HUB

AGH Bulletin

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From AGH's Editorial Market Desk – 24 November 2023

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WORLD NEWS

Sinopec Puts World's Largest LNG Storage Tank Into Operation

1. China Petroleum & Chemical Corporation (Sinopec) has revealed that the world's largest LNG storage tank was put into operation at its Qingdao LNG receiving terminal in China.
2. The construction of the tank with a storage capacity of 270,000 cubic meters began in early 2022 and it was put into service on November 2, 2023.
3. Sinopec will add 165 million cubic meters of storage capacity to meet the gas demand of 2.16 million households for five months during the winter heating season, which will enhance and guarantee the natural gas supply in north China.
4. The LNG storage tank, which is a key project of Qingdao LNG receiving terminal's phase 3 construction, was independently designed, developed, and built by Sinopec, featuring a diameter of 100.6 meters and a height of 55 meters.
5. Meanwhile, Sinopec's Tianjin LNG receiving terminal completed the phase 2 construction with three 220,000-cubic-meter storage tanks coming into full service. This add over 400 million cubic meters of natural gas storing capacity bring the total storage capacity of Tianjin terminal to 108 billion cubic meters, the largest in China.
6. Sinopec's two LNG terminals in Qingdao and Tianjin, with seven and nine storage tanks respectively, have a total of 1.68 billion cubic meters of storage capacity. Source:

AGH Commentary

Sinopec is expected to build more natural gas storage depots and LNG receiving terminals in China to further expand the LNG/natural gas storage capacities to meet the increasing gas demand.

Oman LNG Cements Position With New BP Agreement & Strategic Partnership

1. Oman LNG has inked a nine-year supply agreement with energy titan BP, set to commence in 2026. This agreement, detailed on November 21, will operate on a free-on-board basis.
2. These agreements are part of Oman LNG's comprehensive strategy to renew and expand its business alliances past the year 2024, ensuring long-term operational stability and growth.
3. Simultaneously, a notable deal with Shell International Trading Middle East FZE will see the purchase of up to 1.6 mtpa of LNG from 2025 to 2034. This deal positions Shell as the largest off-taker of LNG from Oman LNG, highlighting the significant trust and reliance placed in Oman's LNG capabilities on the international stage.

AGH Commentary

These agreements of robust global energy partnership mark a new chapter for Oman LNG showcasing its commitment to growth and reliability.

WORLD NEWS (cont'd)

Infrastructure, Planning Key To Developing LNG In Vietnam

1. The importation of LNG must follow international trade standards and regulations while Vietnam is still lacking in many key areas including design, construction and operation of infrastructure for LNG imports.
2. As of now, the country has not yet developed a fully functional legal framework for its LNG power projects. This is especially concerning as LNG prices have seen significant fluctuations in recent years.
3. In addition, LNG power projects often require long-term commitments and are subject to market changes and international geopolitical events. They also often demand and advanced level of technology and large capital investment from experienced and financially capable investors.
4. The biggest challenge for LNG power projects, from an investor's perspective, lies in negotiating power purchase agreement (PPA), which must be conducted in accordance with the regulations of the MoIT.
5. Such projects will likely face fierce competition from other power-generating plants, traditional and renewable, as the Vietnamese government does not offer guarantees for

AGH Commentary

6. Strong investments, additional financial incentives, standardized technical and legal requirements can give the market boost for Vietnam's LNG industry. transport costs and the construction of storage hubs and ports.

Source: The Star, 24 November 2023

HOME

PETRONAS to Supply 40% Non-Fossil Biofuel For Moto2 & Moto3 From Next Year

1. The PETRONAS Primax Pro-Race M2 fuel will be formulated with at least 40% non-fossil biofuel which meets the regulation requirements for next year's world championship.
2. PETRONAS is the official fuel supplier for the lightweight ad intermediate classes.
3. Dorna, the commercial rights holder for the world championships, is aiming to fuel all classes with 100% sustainable fuels by 2027. Source: New Strait Times, 11 November 2023

AGH Commentary

The development of sustainable fuels is key to unlocking new opportunities in energy transition by PETRONAS.

HOME (cont'd)

Japanese Firms, Malaysia's PETRONAS To Set Up C02 Storage By End-2028

1. Japan plans to be carbon-neutral by 2050 and is actively developing renewable and alternative energy sources from hydrogen and ammonia to solar and wind power, with Carbon Capture Storage (CCS) technology also playing an important role in its strategy.
2. Japanese companies have agreed to develop a carbon capture and storage (CCS) project with Malaysian energy firm, PETRONAS which should start holding its first carbon dioxide (CO2) emissions in 2028.
3. Japan Petroleum Exploration Co (JAPEX) is developing the CCS project with JGC Holdings Corp and Kawasaki Kisen Kaisha as well as state controlled – Petronas.
4. The companies plan to start the front-end engineering design next year with a goal to inject and store CO2 from Japan and Malaysia in depleted oil and gas fields off the Malaysian coast.
5. JAPEX has indicated that at least 2 mtpa of CO2 is planned to be injected at the start,

AGH Commentary
The collaboration is likely to rejuvenate the economic growth from the depleted Malaysian oil and gas fields.

Malakoff's Unit Signs Solar Power Purchase Agreement (SPPA) To Develop, Operate & Maintain PV Systems At 3 Gas Malaysia Sites

1. The sites are Gas Malaysia headquarters in Shah Alam, Southern Regional Office in Pasir Gudang, Johor and Eastern Regional Office in Gebeng, Kuantan.
2. The implementation of solar energy solutions and installation of carbon-free mobility infrastructure through this collaboration is a step towards realizing its commitment to achieve 500 megawatts (MW) of solar projects supporting Gas Malaysia aspirations in advancing environmental sustainability.
3. To-date, Malakoff holds a total of 151MW of renewable energy generating capacity under its portfolio, consisting of projects acquired for large scale solar (LSS), rooftop solar (RTS) and small hydropower generation.

AGH Commentary
This initiative demonstrates both Malakoff and Gas Malaysia's dedication on the adoption of green energy .

GLOBAL HIGHLIGHTS – LNG & Natural Gas Snapshots as of 24 November 2023

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ASIA PACIFIC/INDIA

1. The benchmark price reflecting LNG delivered to Northern Asia at USD15.691/MMBtu last week (Nov 14), Platts assessed H1 December at USD15.390/MMBtu and H2 December at USD15.991/MMBtu.
2. While January spot delivery assessed at USD17.15/MMBtu.
3. US LNG producers are focusing to Europe instead of Asia to sell their spot cargoes. As such, Asian buyers may have to pay high premium to procure LNG spot cargoes this winter.

AGH Commentary

Asia and Europe will be battling to receive the extra LNG cargoes out of the US. Prices are supported by reigniting heating demand .

Source: Industry, 24 November 2023

EUROPE

1. Europe's gas benchmark, Dutch TTF's front month December price was traded at Euro46.83/MWh or USD14.92/MMBtu or RM69.88/MMBtu.
2. European natural gas prices surged, driven by rising tensions in the Middle East following the seizure of a vessel in the Red Sea.
3. This incident has raised concerns about potential disruptions in LNG shipments through the Suez Canal.
4. In addition, the onset colder weather across northwestern Europe is likely to increase demand for heating, adding further upward pressure on prices.

AGH Commentary

European gas market will remain volatile due to situation in the Middle East

Source: Industries, 24 November 2023

Freight Charges Selected Regions as of 24 November 2023 (RM/MMBtu)

Export Regions	Japan/Korea	Taiwan/China	Malacca
Bintulu	3.75	3.51	1.87
Singapore	4.22	3.28	0.94
M'cca	4.22	3.75	-

Charter Hire Rate as of 24 November 2023; USD55,000-60,000/Day

Source : Industry, 2023

GLOBAL HIGHLIGHTS – LNG & Natural Gas Outlook as of 24 November 2023

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Global Gas Future Index

Month	JKM Platts Future		TTF Natural Gas Future		CME HH Future	
	USD/ MMBtu	RM/ MMBtu	USD/ MMBtu	RM/ MMBtu	USD/ MMBtu	RM/ MMBtu
Dec	00.00	00.00	▼ 14.92	69.88	▼ 2.90	13.57
Jan 24	▲ 17.15	80.34	▼ 15.18	71.10	▼ 3.03	14.21
Feb 24	▼ 16.74	78.41	▼ 15.28	71.61	▼ 2.98	13.98
Mar 24	▼ 15.91	74.55	▼ 15.19	71.18	▼ 2.83	13.26
Apr 24	▼ 15.30	71.69	▼ 14.89	69.75	▼ 2.75	12.87
May 24	▼ 15.38	72.07	▼ 14.78	69.23	▼ 2.80	13.12
June 24	▼ 15.57	72.96	▼ 14.77	69.21	▼ 2.29	10.74
July 24	▼ 15.773	73.90	▼ 14.78	69.22	▼ 3.05	14.29
Aug 24	▼ 16.054	75.21	▼ 14.76	69.15	▼ 3.09	14.49
Sept 24	▼ 16.117	75.51	▼ 14.83	69.46	▼ 3.08	14.42
Oct 24	▼ 16.492	77.27	▼ 15.00	70.28	▼ 3.15	14.76
Nov 24	▼ 17.431	81.66	▼ 15.79	73.96	▼ 3.53	16.52

Sources: ICE Energy Report , CME Group Market Data

Global Crude Future Benchmark Snapshots in RM per MMBtu

Month	Brent (ICE)	WTI (NYMEX)	JCC (ICE)
Nov23	▼ 69.52	0.00	▼ 79.44
Dec23	▲ 67.72	0.00	▲ 75.06
Jan24	▲ 67.80	▼ 64..04	▲ 72.84
Feb24	▲ 67.66	▲ 64.19	▲ 72.10
Mar24	▲ 67.49	▲ 64.21	▲ 71.69
Apr 24	▲ 67.30	▲ 64.11	▲ 71.37
May 24	▲ 67.11	▲ 63.80	▲ 71.05
June 24	▲ 66.87	▲ 63.79	▲ 70.73
Jul 24	▲ 66.61	▲ 63.32	▲ 70.37
Aug 24	▲ 66.31	▲ 62.83	▲ 69.99
Sep 24	▲ 66.03	▲ 62.93	▲ 69.61
Oct 24	▲ 65.74	▲ 62.19	▲ 69.23

Sources: CME Group Market Data, ICE Energy Report

GLOBAL HIGHLIGHTS – LNG & Natural Gas Outlook as of 24 November 2023 (cont'd)

ASIA GAS HUB

Regional Coal Future Index

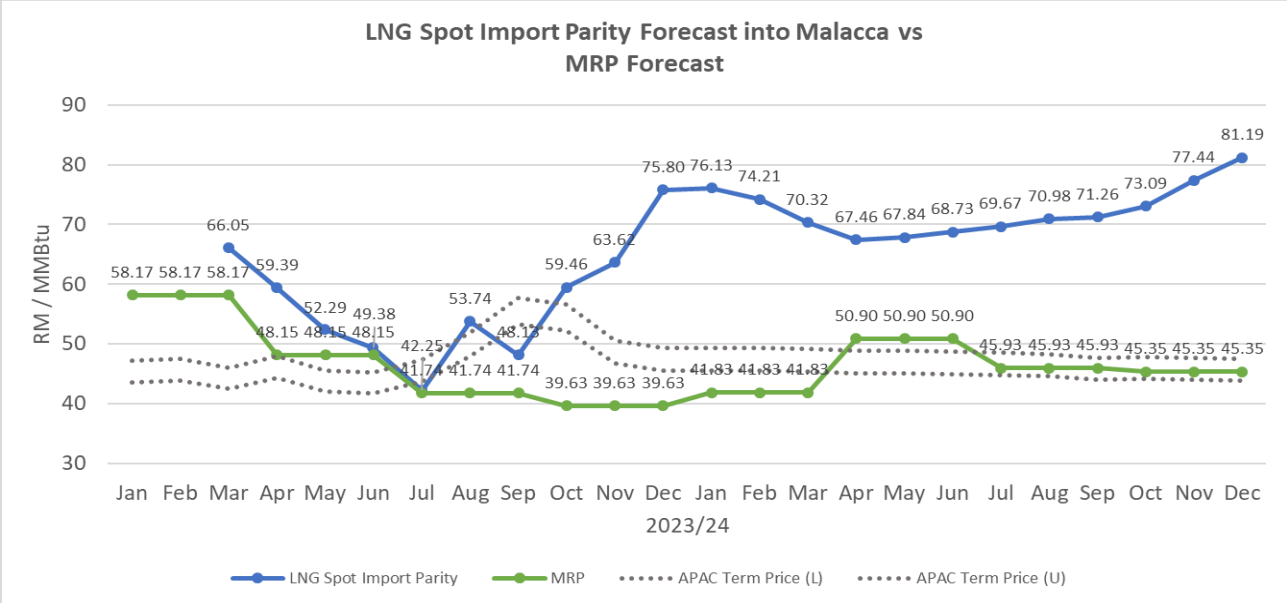
Month	ICE Newcastle Coal Index	
	USD/ MMBtu	RM/ MMBtu
Nov 23	▼ 4.40	20.62
Dec 23	▼ 4.61	21.60
Jan 24	▼ 4.70	22.00
Feb 24	▼ 4.72	22.13
Mar 24	▼ 4.76	22.32
Apr 24	▼ 4.73	22.17
May 24	▼ 4.72	22.13
June 24	▼ 4.76	22.29
July 24	▼ 4.82	22.56
Aug 24	▼ 4.87	22.80
Sept 24	▼ 4.88	22.85
Oct 24	▼ 4.96	23.25

Sources: ICI, www.cmegroup.com; ICE Newcastle Coal index, www.barchart.com

Liquid Petroleum Gas (LPG) Future Index (Saudi Aramco)

Month	Argus Propane Future Index		Mini Argus Butane Future Index	
	USD/ MMBtu	RM/ MMBtu	USD/ MMBtu	RM/ MMBtu
Dec 23	▼ 9.36	43.83	8.77	41.08
Jan 24	▼ 9.23	43.26	8.86	41.53
Feb 24	▼ 9.05	42.42	8.80	41.24
Mar 24	▲ 8.71	40.80	8.49	39.79
Apr 24	▲ 8.30	38.90	8.15	38.17
May 24	▲ 7.96	37.29	7.86	36.82
June 24	▲ 7.78	36.43	7.62	35.72
July 24	▲ 7.71	36.13	7.59	35.56
Aug 24	▲ 7.72	36.16	7.66	35.88
Sept 24	▲ 7.83	36.67	N/A	N/A
Oct 24	▲ 7.99	37.44	N/A	N/A
Nov 24	▲ 8.11	37.97	N/A	N/A

LOCAL HIGHLIGHTS – Domestic Forecast for MRP & LNG Import Parity as of 24 November 2023



Source: AGH Market Analysis

Month	Import Parity - MRP Spread	Change	APAC Term Ave - MRP Spread	Change
Sep-23	6.39	0.00	13.80	0.00
Oct-23	19.83	0.00	14.75	0.00
Nov-23	23.99	-0.54	9.03	-0.65
Dec-23	36.18	-0.65	7.78	-0.31
Jan-24	34.30	-0.27	5.63	-0.09
Feb-24	32.38	-1.34	5.53	-0.09
Mar-24	28.49	-2.02	5.41	-0.09
Apr-24	16.56	-3.08	-3.93	-0.23
May-24	16.93	-2.61	-3.93	-0.11
Jun-24	17.82	-1.91	-4.09	-0.11
Jul-24	23.74	2.97	0.70	3.92
Aug-24	25.05	3.49	0.49	3.90
Sep-24	25.33	2.07	-0.08	3.52
Oct-24	27.74	1.55	0.67	3.28
Nov-24	32.09	3.17	0.47	3.26
Dec-24	35.84	3.71	0.25	3.24

Source: AGH Market Analysis

AGH Commentary

The spread between Import Parity and MRP maintains wide, and the LNG purchase price on term is still at 12%-12.5% Brent, maintaining the right move to bring in the cargo starting April 2024 onwards.

MRP = Malaysia Reference Price used for domestic market

LOCAL HIGHLIGHTS – Peninsular Gas Utilities (PGU) Gas Volume Updates as of 24 November 2023

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There is no change in available capacity from last week.

Northern Region			
State	Exit CITY GATE (CG)/Metering Station (MS)	Available Capacity	
		MMscf/d	MMBtu/d
Perlis	Tambun Tulang CG	10.97	11375.89
	Ayer Puteh CG	30.92	32064.04
	TTPC MS	55.86	57926.82
Kedah	Pondok Labu CG	19.21	19920.77
	Kulim Hi Tech CG	75.18	77961.66
	Sungai Petani CG	20.44	21196.28
	Pokok Sena CG	20.86	21631.82
	PFK MS	16.25	16851.25
	NUR MS	200.97	208405.89
Penang	Prai CG	24.97	25893.89
	TNB Prai MS	98.28	101916.36
	TNB Gelugor MS	23.35	24213.95
	Prai Power MS	110.22	114298.14

Eastern Region			
State	Exit CITY GATE (CG)/Metering Station (MS)	Available Capacity	
		MMscf/d	MMBtu/d
T'gganu	Kerteh CG	0.89	922.93
	Teluk Kalong CG	8.68	9001.16
	Kerteh 3 CG	96.3	99863.1
	Kerteh 2 CG	3.79	3930.23
	TNB Paka MS	208	215696
	YTL Paka MS	139.16	144308.92
	CUF Kerteh MS	105.52	109424.24
Pahang	CUF Gebeng MS	125.84	130496.08
	Gambang CG	0.49	508.13
	Gebeng CG	29.51	30601.87
	Gebeng 2 CG	68.6	71138.2
	PCEMSB MS	8.46	8773.02
	PCASB MS	7	7259
	Aromatic KR2 MS	3.3	3422.1
	PCOGD MS	50.51	52378.87
	PERWAJA MS	50.88	52762.56
	MTBE NG MS	11.6	12029.2
	PDH MS	8.4	8710.8
	BASF Fuel	8.29	8596.73
	BASF Feedstock	2.1	2177.7
	Idemitsu MS	9.83	10193.71
	Titan MS	37.78	39177.86
	Genting Sayen MS	47.95	49724.15

Source: PETRONAS Gas Berhad

IBR Base Average Tariff of GMD Natural Gas Distribution System

Year	2023	2024	2025
Rebate RM/GJ/Day	0.038	N/A	N/A
RM/GJ/Day	1.535	1,573	1.573

IBR : Incentives Based Regulation
GMD : Gas Malaysia Distribution (owner & operator of gas distribution line)
GJ : Gigajoules
RM : Ringgit Malaysia

LOCAL HIGHLIGHTS – Peninsular Gas Utilities (PGU) Gas Volume Updates as of 24 November 2023 (cont'd)

ASIA GAS HUB

There is no change in available capacity from last week

Central Region

State	Exit CITY GATE (CG)/Metering Station (MS)	Available Capacity	
		MMscf/d	MMBtu/d
Klang Valley	KLIA CG	0.06	62.22
	Dengkil CG	71.6666	74318.2642
	Puchong CG	14.64	15181.68
	Batu Tiga CG	37.76	39157.12
	GB3 MS	93.48	96938.76
	Connaught Bridge MS	186.77	193680.49
	GDC KLIA MS	1.9	1970.3
	PNGV KLIA 1	0.47	487.39
	PNGV KLIA 2	0.7	725.9
	PNGV KLIA 3	0.41	425.17
	Venator MS	7.6	7881.2
S'gor	Serdang CG	76.4	79226.8
	Shah Alam CG	80.37	83343.69
	Kapar CG	9.07	9405.59
	Meru CG	95.42	98950.54
	Bestari Jaya CG	8.74	9063.38
	Kuala Langat Power Plant MS	50.35	52212.95
	Serdang MS	174.67	181132.79
	Kapar MS	268.04	277957.48
N.Sembilan	Seremban CG	15.91	16498.67
	Seremban 2 CG	10.29	10670.73
	Bandar Baru Nilai CG	10.66	11054.42
	Tebong CG	25.23	26163.51
	Port Dickson MS	230	238510

Western Region

State	Exit CITY GATE (CG)/Metering Station (MS)	Available Capacity	
		MMscf/d	MMBtu/d
Perak	Kamunting CG	20.96	21735.52
	Parit Buntar CG	18.47	19153.39
	Ayer Tawar CG	16.19	16789.03
	Hutan Melintang CG	47.86	49630.82
	Merbau CG	78.5	81404.5
	Tronoh CG	4	4148
	SEV Lumut MS	180.42	187095.54

Source: PETRONAS Gas Berhad

Southern Region

State	Exit CITY GATE (CG)/Metering Station (MS)	Available Capacity	
		MMscf/d	MMBtu/d
Johor	Kluang CG	39.24	40691.88
	Kulai CG	18.2	18873.4
	Senai CG	114.96	119213.52
	Pasir Gudang CG	237	245769
	Plentong CG	74.2	76945.4
	Tg Langsat CG	17.66	18313.42
	Paya Rumput CG	14.11	14632.07
	TNB Pasir Gudang MS	279.57	289914.09
	Pengerang COGEN Power MS	111.61	115739.57
	Southern Power Generation MS	20	20740
	Plentong (Senoko) MS	145	150365
	Plentong 2 (Keppel) MS	118	122366
M'cca	Alor Gajah CG	9.25	9592.25
	Tanjung Kling MS	50.01	51860.37
	Tanjung Gemok MS	38.93	40370.41
	Teluk Gong MS	111	115107
	Panglima MS	25.31	26246.47
	EDRA Energy Sdn Bhd	210.21	217987.77
	Tangga Batu Refinery MS	32.66	33868.42
	Tangga Baru Cogen MS	12.34	12796.58

IBR Tariff for Peninsular Gas Utilization

Year	2023	2024	2025
RM/GJ/Day	1.061	1.063	1.063

IBR Tariff for Regassification Facilities

Facilities	RGTSU	RGTP
RM/GJ/Day	3.455	3.165

IBR : Incentives Based Regulation
GJ : Gigajoules
RM : Ringgit Malaysia
RGTSU : Regas Terminal Sungai Udang, Malacca
RGTP : Regas Terminal Pengerang

FUN FACTS

1 Thousands of ships could use LNG as fuel. Is that a good thing?

1. There are currently 936 commercial vessels (including passenger ships) in service that are "LNG Capable", i.e. designed to burn either fuel oil or LNG. An additional 876 LNG-capable ships are on order.
2. There are also 413 ships in service that are "LNG-ready", meaning they're designed to be more easily converted to future LNG-fuel use, and an additional 95 LNG-ready ships on order.
3. Container shipping has invested in LNG-fuel designs. Of total container ships in service and on order, 475 are either LNG-capable or LNG-ready.

Source: Clarkson Research

2 ChatGPT Let's ask…

How Many Moss-Types of LNG Carriers?

There are mainly tree types of LNG carriers based on their containment systems, and they are:

1. Moss-Type LNG Carriers (Moss Rosenberg Type). These carriers use a spherical storage tank design. The tanks are made of spherical aluminum or aluminum alloy, and they are surrounded by a cylindrical or box-shaped outer hull. The Moss-type is one of the older designs and is known for its distinctive appearance.
2. Membrane-Type LNG Carriers. In these carriers, the cargo containment systems consists of a thin membrane made of materials such as Invar or stainless steel. The membrane is supported by insulation and a secondary barriers. This type of LNG carrier is known for its flexibility in adapting to the shape of the ship's hull.
3. Independent Type LNG Carriers. This type is a more recent development and features independent self-supporting prismatic tanks. The tanks are not directly supported by the ship's hull, which allow for a more flexible design.

Source: Chat GPT

ATTENTION! Gas-X is open for Registration

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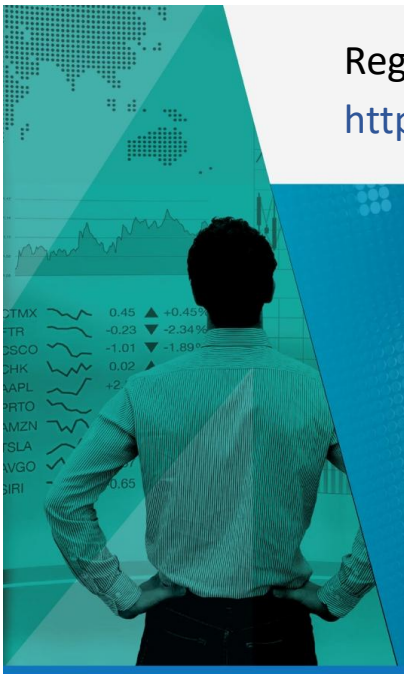
Register your interest at:
https://asiagashub.com/gasx/

GasX



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