LNG DAILY

Volume 18 / Issue 224 / November 15, 2021

JKM rises on emerging demand, higher Atlantic prices

JKM ™	AAOVQ00	**31.723**	**+0.938** ▲
Cumulative monthly average (Dec)	AAOVS00	31.612	
Previous month average (Nov)	AAOVS03	33.254	
CNL WTW JKTC	ACNLF00	0.909	

KEY DRIVERS / MARKET HIGHLIGHTS

- Asia-Pacific physical MOC: Uniper offers Jan. 4-6 delivery cargo
- Asia-Pacific derivatives MOC: 4 entities post 9 bids and 8 offers
- EGAT purchased from PTT International Dec. 21-23 cargo
- IOC issued a buy tender Dec. 8-20 delivery to Ennore
- GSPC issued a buy tender for late Dec-early Feb
- Platts assesses Northwest Europe at highest level since Oct. 27
- Thinly-traded spreads as front-month prepares to turn

SHIPPING MARKET HIGHLIGHTS

- Day rates at $260,000/day in Pacific basin
- Tangguh Palung heard on subs by Unipec for January loading

NEWS HEADLINES

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SHIPPING RATES, NOV 15

		$/day		Ballast rate
Asia Pacific day rate	AARXT00	260,000	AAXTN00	100%
Atlantic day rate	AASYC00	210,000	AAXTM00	100%
TCR Australia-Japan	ATCRA00	260,000.00		
TCR USG-NWE	ATCRB00	210,000.00		
TCR USG-Japan	ATCRC00	210,000.00		

DAILY CUMULATIVE AVERAGES AND MONTHLY AVERAGES

Nov 15 ($/MMBtu)		Cumulative monthly average		Previous month average		
JKM	AAOVS00	31.612	Dec	AAOVS03	33.254	Nov
DES West India	AALIC00	29.420	Dec	AAWIC03	31.934	Nov
DES Mediterranean	AADCU00	27.309	Dec	AASWC03	29.207	Nov
DES Northwest Europe	AASDF00	27.355	Dec	AASDE03	29.202	Nov
FOB GCM Loading Month	LGCSM00	24.610	Dec	LGCSM31	27.329	Nov
JKM Yen	AAOVT00	3598.779	Dec	AAOVT03	3707.118	Nov
JKM Yuan	LJCWM00	202.368	Dec	LJCWM03	189.189	Nov

PLATTS DAILY LNG MARKERS ($/MMBtu)

Nov 15			Change	
DES Japan/Korea Marker (JKM)				
JKM (Dec)	AAOVQ00	31.723	0.938	▲
H1 Dec	AAPSU00	31.375	0.950	▲
H2 Dec	AAPSV00	32.070	0.925	▲
H1 Jan	AAPSW00	32.540	0.906	▲
H2 Jan	AAPXA00	32.750	0.925	▲
JKM (Dec) Japanese Yen	AAOVR00	3612.932	101.903	▲
JKM (Dec) Chinese Yuan (CNY/mt)	LJCMS00	10540.259	284.606	▲
DES Japan/Korea (JKM) derivatives Singapore close*				
Balmo-ND	LJKMB00	NA	NA	NA
Dec	LJKMO00	31.612	0.062	▲
Jan	LJKMO01	32.290	0.940	▲
Feb	LJKMO02	31.050	0.650	▲
DES Japan/Korea (JKM) derivatives London close*				
Dec	JKLMO00	31.612	0.792	▲
Jan	JKLMO01	33.100	2.480	▲
Feb	JKLMO02	31.350	2.059	▲
DES Mediterranean Marker (MED)				
MED (Dec)	AASXY00	27.284	2.055	▲
H1 Dec	AASXZ00	27.184	2.055	▲
H2 Dec	AASYA00	27.384	2.055	▲
H1 Jan	AASYB00	27.455	1.976	▲
DES Northwest Europe Marker (NWE)				
NWE (Dec)	AASXU00	27.284	2.055	▲
H1 Dec	AASXV00	27.184	2.055	▲
H2 Dec	AASXW00	27.384	2.055	▲
H1 Jan	AASXX00	27.505	2.026	▲
Middle East Marker (MEM)				
MEM (Dec)	LMEMA00	29.150	0.962	▲
H1 Dec	LMEMB00	28.925	0.925	▲
H2 Dec	LMEMC00	29.375	1.000	▲
H1 Jan	LMEMD00	29.700	0.900	▲
H2 Jan	LMEME00	29.900	0.925	▲
DES West India Marker (WIM)				
WIM (Dec)	AARXS00	29.150	0.962	▲
H2 Nov	LMEAA00	28.825	0.925	▲
H1 Dec	LMEAB00	28.925	0.925	▲
H2 Dec	LMEAC00	29.375	1.000	▲
H1 Jan	LMEAD00	29.700	0.900	▲
H2 Jan	LMEAE00	29.900	0.925	▲
DES West India Marker (WIM) derivatives Singapore close*				
Dec	AWIMB00	29.420	-0.230	▼
Jan	AWIMM01	30.465	0.940	▲
Feb	AWIMM02	29.400	0.625	▲
FOB Gulf Coast Marker (GCM)				
GCM	LGCSM01	25.200	1.900	▲

*For full forward curve, see page 4

LNG NETBACK PRICES ($/MMBtu)

Nov 15			Change	
FOB Australia	AARXR00	29.280	0.900	▲
FOB Middle East	AARXQ00	28.400	1.000	▲
DES Brazil Netforward	LEBMH01	27.920	1.980	▲
FOB Singapore	AARXU00	29.813	0.898	▲
FOB Murmansk	AARXV00	26.254	2.015	▲

MARKET COMMENTARIES

JKM rises on emerging demand, higher Atlantic prices

Asian LNG prices went up on Nov. 15 following higher prices in the Atlantic and pockets of demand emerging from Japan and India.

The Platts JKM for December was assessed at $31.723/MMBtu Nov. 15.

The first half of December was assessed at $31.375/MMBtu and H2 December at $32.070/MMBtu, with a narrower day-on-day intramonth contango structure of 69.5 cents/ MMBtu Nov. 15, compared to a contango of 72 cents/MMBtu Nov. 12.

On recent tender results, EGAT's buy tender for Dec. 21-23 delivery cargo was awarded at low $30s/MMBtu to PTT International, sources said.

ADNOC's sell tender for six cargoes was heard awarded at mid-16% on a Brent-linked slope to Gazprom, according to multiple sources.

A Korean importer purchased a Jan. 16-18 delivery cargo on Nov. 12, five sources told Platts on Nov. 15. However, details regarding the seller and the price could not be confirmed at the time of publication.

On Nov. 12, a trading house was heard to have sold a Jan. 5-7 delivery cargo at a small premium to Jan JKM average, sources said.

A major Japanese importer was seeking a December delivery cargo since Nov. 12, multiple sources told Platts on Nov. 15. However, it could not be determined whether the entity already fulfilled this requirement at the time of publication.

A western Japanese power utility was heard possibly seeking an early December delivery cargo, while offering a late December or early January delivery cargo, according to three sources.

On the sell side, ENN was heard offering a December and January delivery cargo, several sources told Platts on Nov. 15.

During the physical MOC process, Uniper offered a Jan. 4-6 delivery cargo at JKM January average plus 10 cents/MMBtu, with a volume of 3.1-3.3 TBtu and GHV of 1,030-1,130 Btu/cu ft with 30 mg/nm3 maximum total sulfur.

On the derivatives MOC process, Dare placed the most competitive bid for December derivatives at $31.50/MMBtu (25 lots) while PetroChina offered the most competitive offer at $31.65/MMBtu (25 lots).

For January derivatives MOC, Dare placed the most competitive bid at $31.91/MMBtu while PetroChina offered most competitively at $32.30/MMBtu. Platts assessed January JKM derivatives Singapore close at $32.29/MMBtu below the offer.

Elsewhere, IOC issued a buy tender for a Dec. 8-20 delivery cargo to Ennore. The tender closes Nov. 19, according to multiple sources.

GSPC issued a buy tender for two cargoes for Dec. 26-Jan. 5 delivery and Jan. 26-Feb. 5 delivery into Mundra. The tender closes Nov. 16, sources said. — *Masanori Odaka*

Strong UK gas demand bolsters European LNG prices amid wind power drop

The price for LNG delivered to Northwest Europe reached its highest level in almost three weeks Nov. 15, as UK gas demand strengthened due to weaker wind power generation, and Russian pipeline flows to

PLATTS LNG ASIA JKM RATIONALE & EXCLUSIONS

The Platts JKM for December was assessed at $31.723/MMBtu Nov. 15.
The first half of December was assessed at $31.375/MMBtu and H2 December at $32.070/MMBtu, with a narrower day-on-day intramonth contango structure of 69.5 cents/ MMBtu Nov. 15, compared to a contango of 72 cents/MMBtu Nov. 12.
Uniper reported an offer for a Jan. 4-6 DES JKTC cargo, with volume of 3.1-3.3 TBtu and total sulfur limit of 30 mg/Nm3. The offer was normalized 32 cents/MMBtu higher on a wider and lower quantity range, higher sulfur limit and larger vessel size, and equated to a fixed price of $32.710/MMBtu.
During the derivatives Platts Market on Close assessment process, PetroChina placed the most competitive offer for 25 lots of January JKM derivative at $32.30/MMBtu and Dare placed the most competitive bid for 25 lots at $31.91/MMBtu. Platts assessed January JKM Singapore at $32.290/MMBtu at the Asian close Nov. 15, above the bid and below the offer.
This rationale applies to symbol(s) <AAOVQ00>
Exclusions: No data was excluded from the Nov. 15 assessment.

PLATTS LNG ASIA WIM RATIONALE & EXCLUSIONS

The S&P Global Platts WIM for December was assessed at $29.15/MMBtu Nov. 15.
Platts assessed first-half and second-half December at $28.925/MMBtu and $29.925/MMBtu, respectively, with a wider intramonth contango structure of 45 cents/MMBtu on Nov. 15, compared with 37.5 cents/MMBtu Nov 12.
Platts assessed the December JKM/WIM spread at $2.573/MMBtu Nov. 15.
This rationale applies to symbol(s) <AARXS00>.
Exclusions: None

PLATTS LNG US FOB GULF COAST DAILY RATIONALE & EXCLUSIONS

The FOB Gulf Coast Marker was assessed at $25.20/MMBtu Nov. 15.
The assessment was based on tradable values reported by market participants at $24.75/MMBtu by the middle of the day for FOB USGC cargoes loading 30 to 60 days forward, in conjunction with upward movements in prices in destination markets and sustained strength in shipping rates for deliveries through the Atlantic and Pacific, spurred in part by extended maximum wait times for unreserved LNG tankers transiting the Panama Canal.
This rationale applies to symbol(s) <LGCSM01>
Exclusions: None

PLATTS LNG EUROPEAN ASSESSMENT RATIONALE & EXCLUSIONS

The Northwest Europe marker for December was assessed Nov. 15 at $27.284/MMBtu
H1 NWE for December was assessed at $27.184/MMBtu
H2 NWE for December was assessed at $27.384/MMBtu
The NWE prices were assessed higher day on day reflecting rising outright prices for December TTF. The TTF December contract rose from market open at Eur78.300/MWh to Eur80.750/MWh at market close. NBP/TTF premiums rose 9 cents/MMBtu day on day to 67 cents/MMBtu at 4:30 pm London time on Nov 15. The UK saw weaker wind power generation Nov. 15. Wind power generation stood at 1.89 GW, roughly 5% of the generation mix. This was down roughly 10 GW from the average 12 GW generation, according to National Grid data. This has led to gas demand into the UK strengthening, now occupying 55% of the generation mix. Additionally, LNG storage withdrawals were made Nov. 15 out of Dragon and Isle of Grain terminals amid weaker power generation.
The Mediterranean Marker (MED) for December was assessed at $27.284/MMBtu
H1 MED for December was assessed at $27.184/MMBtu
H2 MED for December was assessed at $27.384/MMBtu
The MED price was assessed lower day on day. MED prices were assessed flat to NWE, with comparable premiums into both UK and Spanish gas hubs. Spanish gas inventories saw a small withdrawal, but inventories still remained 9 percentage points higher than the European average Nov. 15.
The assessments were based on pricing information from market sources for cargoes delivering within the region for December delivery.
This rationale applies to symbol(s) <AASXU00, AASXY00>
Exclusions: none

REPORTED ATLANTIC BIDS, OFFERS AND TRADES ($/MMBtu)

Date	Seller	Loading	Buyer	Basis	Loading window	Offer/Bid	Notes
Best bids/offers							
Nov 15							

REPORTED APAC BIDS, OFFERS AND TRADES ($/MMBtu)

Date	Buyer	Destination	Seller	Source	Basis	Delivery period	Bid/Offer	Notes
Best bids/offers								
Nov 15		JKTC	Uniper		DES	Jan 4-6	Jan JKM+0.10 offer	MOC
Last 5 trades		**APAC**						
Nov 11	Trafigura	JKTC	Shell		DES	Dec 13-15	Jan TTF plus 5.05 traded bid	MOC
Nov 09	Unverified	JKTC	ADNOC		FOB	April 7-13, May 15-21, June 12-18, July 20-26, Aug 20-26, Sep 17-23	16-17% Brent	Tender
Nov 09	Trafigura	JKTC	Shell		DES	Jan 5-7	32.30	MOC
Oct 26	PTT	Thailand		Qatar	DES	Nov 27-29, Dec 3-5	low-33	Tender
Oct 22	Vitol	JKTC	PetroChina		DES	Dec 6-8	Dec TTF plus 3.05 traded offer	MOC

Germany remained steady.

S&P Global Platts assessed DES Northwest Europe for December up $2.055/MMBtu at $27.284/MMBtu Nov. 15, the highest since Oct. 27. The first half of December was assessed at $27.184/MMBtu and the second half of December was assessed at $27.384/MMBtu, maintaining the intramonth contango at 20 cents/MMBtu seen last week.

Dutch TTF December futures moved in an intraday range of Eur 77.845/MWh to Eur 81.27/MWh. Platts assessed the TTF December contract at $26.984/MMBtu Nov. 15, up $1.952/MMBtu on the day.

Spreads were thinly traded in the JKM derivatives market during European hours. An Atlantic-based trader heard a JKM-TTF swap spread bid for January at $5.875/MMBtu and an offer at $6.125/MMBtu. Another Atlantic-based trader heard a swap spread offer for January at $6.150/MMBtu, while a third heard a JKM-TTF swap spread bid for January at below $6/MMBtu, just after market close.

The UK saw weaker wind power generation Nov. 15. Wind power generation stood at 1.89 GW, about 5% of the generation mix, down about 10 GW from the average 12 GW generation, according to data from utility National Grid. That has led to strengthening UK gas demand, now occupying 55% of the generation mix. LNG storage withdrawals were made Nov. 15 out of Dragon and Isle of Grain terminals amid weaker power generation.

Meanwhile, Russian pipeline gas flows were steady above 300 MMcf/d at the Mallnow gas compressor that serves West Germany. Russia's Gazprom Export failed to schedule any auctions on its Electronic Sales Platform for the week of Nov. 15-19, the second consecutive week that no auctions will be held. Gazprom Export launched the ESP in September 2018 as a tool to sell surplus gas into Europe outside of its traditional long-term contract model.

An Atlantic-based trader cited the auction results and said that "weather is meant to turn very cold next week."

Day rates were at $260,000/day for the Pacific basin and increased by $5,000 to $210,000/day in the Atlantic.

The Tangguh Palung, 155,000 cu m, was heard on subjects by Unipec, the trading arm of China's Sinopec, for a period of three months starting January 2022, with the rate not reported. China's CNOOC was reported with tonnage requirement for a Dec. 30-31 loading ex QCLNG, Australia for a period of 17 days.

China's ENN was heard to have fixed an LNG tanker for a period of three years, with the rate not reported. Qatar Petroleum tonnage requirement for a Dec. 23 loading ex Ras Laffan, with delivery in India, was reported still not covered.

The maximum wait for unreserved tankers at the Panama Canal jumped anew to 19 days northbound and 13 days southbound, according to the Panama Canal Authority.

The Henry Hub prompt-month contract was trading up 14 cents at $4.93/MMBtu as of early afternoon US local time. — *Harry Weber, Zack Smith, Michael Hoffmann*

NEWS

LNG to help meet Turkish winter demand amid rising consumption: deputy minister

- **Turkish gas demand set to reach some 60 Bcm in 2021**
- **Turkey in talks on renewal of Russian import contracts**
- **Eyes enough Russian volume to fill existing pipelines**

LNG imports will help meet gas demand in Turkey this winter amid rising levels of consumption, deputy energy minister Alparslan Bayraktar said Nov. 15.

Speaking on the sidelines of the ADIPEC conference in Abu Dhabi, Bayraktar also told S&P Global Platts that Turkey was in talks with Russia on the renewal of its gas import arrangements.

"Gas consumption in Turkey is increasing so we are expecting more LNG this winter to come to Turkey," Bayraktar said.

"We have some long-term contract [supply] and we have some spot cargoes for the balancing of the demand," he said.

Turkish gas demand in 2021 could exceed 60 Bcm, with energy minister Fatih Donmez saying earlier this month that consumption was expected to be 10-12 Bcm higher than the 48.5 Bcm reported in 2020.

Turkish LNG imports so far in 2021 have totaled 10.3 Bcm of gas equivalent, according to data from S&P Global Platts Analytics, compared with around 13 Bcm in the same period last year.

Russian pipeline deliveries have displaced some LNG amid sky high spot LNG prices.

The S&P Global Platts benchmark JKM LNG spot price price hit a

ASIA/MIDDLE EAST ($/MMBtu), NOV 15*

DES Japan/Korea Marker (JKM)		
JKM (Dec)	AAOVQ00	31.723
JKM (H1 Dec)	AAPSU00	31.375
JKM (H2 Dec)	AAPSV00	32.070
JKM (H1 Jan)	AAPSW00	32.540
JKM (H2 Jan)	AAPXA00	32.750
Asian Dated Brent (16:30 Singapore)	ADBAA00	14.16
JKM vs Henry Hub futures	AAPRZ00	26.905
JKM vs NBP futures	AAPSA00	4.709
JKM vs TTF	LNTFJ00	4.739
JKM vs Asian Dated Brent (16:30 Singapore)	AAPSB00	17.561
JKM vs MED (16:30 London)	ALNGB00	4.439
JKM vs NWE (16:30 London)	ALNGA00	4.439

DES Japan/Korea (JKM) derivatives Singapore close		
Balmo-ND	LJKMB00	NA
Dec	LJKMO00	31.612
Jan	LJKMO01	32.290
Feb	LJKMO02	31.050
Mar	LJKMO03	27.775
Q1 2022	LJKQR01	30.372
Q2 2022	LJKQR02	15.900
Summer 2022	LJKSN01	15.175
Winter 2022	LJKSN02	15.350
2022	LJKYR01	18.600
2023	LJKYR02	11.850
2024	LJKYR03	9.300

DES Japan/Korea (JKM) derivatives London close		
Dec	JKLMO00	31.612
Jan	JKLMO01	33.100
Feb	JKLMO02	31.350
Mar	JKLMO03	26.760
Q1 2022	JKLQR01	30.403
Q2 2022	JKLQR02	15.931
Summer 2022	JKLSN01	15.065
Winter 2022	JKLSN02	15.490
2022	JKLYR01	18.900
2023	JKLYR02	12.150
2024	JKLYR03	9.114

DES West India Marker (WIM)		
WIM (Dec)	AARXS00	29.150

DES West India Marker (WIM) derivatives Singapore close		
Dec	AWIMB00	29.420
Jan	AWIMM01	30.465
Feb	AWIMM02	29.400
Mar	AWIMM03	25.775
Q1 2022	AWIMQ01	28.547
Q2 2022	AWIMQ02	14.400
Summer 2022	AWISN01	13.700
Winter 2022	AWISN02	13.825
2022	AWIMY01	17.075
2023	AWIMY02	10.375
2024	AWIMY03	7.825

Carbon Neutral LNG		
CNL WTW JKTC Differential (ex-Australia)	ACNLF00	0.909
CNL WTT JKTC Differential (ex-Australia)	ACNLB00	0.201
CNL DES JKTC Differential (ex-Australia)	ACNLG00	0.193
CNL Combustion JKTC	ACNLJ00	0.709

FOB Middle East		
FOB Middle East	AARXQ00	28.400

FOB Australia (netback)		
JKM (Dec)	AAOVQ00	31.723
(-) Freight	AAUSA00	2.44
FOB Australia	AARXR00	29.28

Key gas price benchmarks			
Japan Customs Cleared LNG (Aug)	LAKPN00	10.15	Final
Japan Customs Cleared LNG (Sep)	LAKPM00	10.78	Estimated

Platts Dutch TTF		
Dec	GTFWM10	26.984
Jan	GTFWM20	27.051

Competing fuel prices			
Japan Customs Cleared crude oil (Aug) ($/b)	AAKOP00	73.78	Final
Japan Customs Cleared crude oil (Sep) ($/b)	AAKOM00	73.81	Estimated
HSFO 3.5% sulfur 180 CST FOB Singapore	LUAXZ00	11.27	
NEAT Coal Index	JKTCB00	5.929	
Minas crude oil	LCABO00	13.436	
Naphtha CFR Japan	LNPHJ00	16.482	

EUROPE ($/MMBtu), NOV 15

		$/MMBtu		Eur/MWh		Eur/MMBtu
DES Mediterranean Marker (MED)						
MED (Dec)	AASXY00	27.284	LNMTA00	81.436	LNMXA00	23.885
MED (H1 Dec)	AASXZ00	27.184				
MED (H2 Dec)	AASYA00	27.384				
MED (H1 Jan)	AASYB00	27.455				
Dated Brent (16:30 London)	ADBAB00	14.06				
MED vs Henry Hub futures	AASYF00	22.386				
MED vs TTF	LNTFS00	0.300				
MED vs NBP futures	AASYH00	-0.459				
MED vs Dated Brent (16:30 London)	AASYJ00	13.227				
MED vs NWE	ALNSA00	0.000				
MED vs JKM	AASYM00	-4.439				
DES Northwest Europe Marker (NWE)						
NWE (Dec)	AASXU00	27.284	LNNTA00	81.436	LNNXA00	23.885
NWE (H1 Dec)	AASXV00	27.184				
NWE (H2 Dec)	AASXW00	27.384				
NWE (H1 Jan)	AASXX00	27.505				
Dated Brent (16:30 London)	ADBAB00	14.06				
NWE vs Henry Hub futures	AASYE00	22.386				
NWE vs TTF	LNTFN00	0.300				
NWE vs NBP futures	AASYG00	-0.459				
NWE vs Dated Brent (16:30 London)	AASYI00	13.227				
NWE vs MED	AASYK00	0.000				
NWE vs JKM	AASYL00	-4.439				
NWE as a % of NBP	AASYD00	98.34				
Competing fuel prices						
Northwest Europe fuel oil	LAEGR00	12.64				
CIF ARA 15-60 day thermal coal	CSAAB00	5.54				

NORTH AMERICA ($/MMBtu), NOV 15

FOB Gulf Coast Marker (GCM)		
GCM	LGCSM01	25.200
Dated Brent (16:30 London)	ADBAB00	14.06
GCM vs JKM	LGMJM01	-6.523
GCM vs Henry Hub futures	LGMHM01	20.183
GCM vs TTF	LNTFG00	-1.784
GCM vs NWE	LGEUR00	-2.084
GCM vs MED	LGMET00	-2.084
GCM vs NBP futures	LGMNM01	-2.544
GCM vs Dated Brent (16:30 London)	LGMDB00	11.143
GCM vs USGC HSFO	LGMFO00	14.580
Competing fuel prices		
US Gulf Coast high sulfur fuel oil	LUAXJ00	10.70
New York Harbor 1%S fuel oil	LUAXD00	12.58

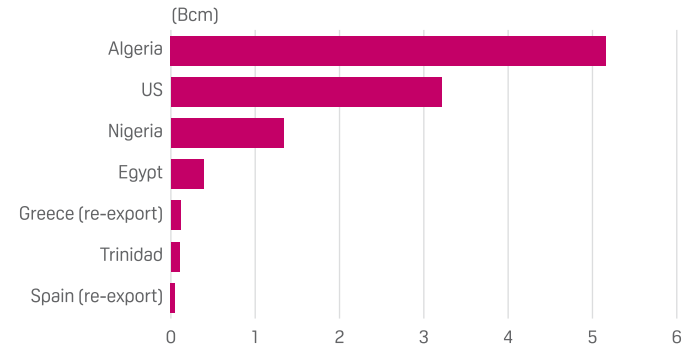
*Japan Customs Cleared value shows latest available CIF price published by the Ministry of Finance, converted to US dollars per MMBtu. All other values reflect Platts most recent one-month forward assessments for each product in each region, converted to US dollars per MMBtu. JKM Marker, SWE LNG and NWE LNG average the assessments of the two half-months comprising the first full month of forward delivery. Asian LNG assessments assessed at Singapore market close 0830 GMT, European LNG assessment assessed at London market close 1630 UK time. NYMEX Henry Hub futures and ICE NBP futures values taken at Singapore market close and London market close. ICE NBP futures converted from Pence/Therm to $/MMBtu. Asian Dated Brent crude oil assessed at Asian market close 0830 GMT and converted from $/barrel to $/MMBtu. Detailed assessment methodology is found on www.platts.com.

RECENT TENDERS AND STRIPS

Tender/ strip November 15	Issuer/location	Tender type	(Loading) or delivery period	Slots/ cargoes	Opening	Closing date	Validity	Notes	Results
Tender	EGAT - Map Ta Phut	Buy	16-Dec-21 - 23-Dec-21	1 DES			12-Nov-21		heard awarded at low $30s/ MMBtu to PTT International
Tender	EGAT - Map Ta Phut	Buy	10-Dec-21 - 18-Dec-21	1 DES		03-Nov-21		One cargo buy tender for Dec. 10-12 or Dec. 16-18 delivery	
Tender	Petronas - PFLNG Dua	Sell	05-Dec-21 - 06-Dec-21	1 DES		10-Nov-21			
Tender	Kansai Electric - Japan	Buy	05-Jan-22 - 10-Jan-22	1 DES or FOB	10-Nov-21	10-Nov-21	10-Nov-21	Closed on 6:30 PM Japan standard time, 1-hour validity until 7:30 PM JST	
Tender	Angola LNG - Angola LNG	Sell	16-Nov-21 - 15-Dec-21	1 DES		10-Nov-21		furthest delivery to Arun	
Tender	Sonatrach - Algeria	Sell	(01-Nov-21 - 15-Nov-21)	3 FOB					
Tender	APLNG - Australia Pacific LNG	Sell	(28-Dec-21 - 28-Dec-21)	1 DES or FOB	08-Nov-21				
Tender	Adnoc - ADNOC Das Island	Sell	(07-Apr-22 - 23-Sep-22)	6 FOB		09-Nov-21		loading dates: April 7-13, May 15-21, June 12-18, July 20-26, Aug 20-26, Sep 17-23 Brent-linked basis	
Tender	BOTAS - Turkey	Buy	01-Dec-21 - 28-Feb-22	9 DES		04-Nov-21		9 cargo tender, closing Nov.4	
Tender	Pakistan LNG - Port Qasim	Buy	19-Nov-21 - 27-Nov-21	2 DES	02-Nov-21	05-Nov-21	05-Nov-21	Two cargo buy tender for Nov. 19-20 and Nov. 26-27 delivery. Closes on Nov. 5, 1200 hours PST. Validity until 2300 hours PST.	
Tender	Oman LNG - Oman LNG	Sell	(01-Dec-21 - 03-Dec-21)	1 DES or FOB		21-Oct-21		Closing 1pm Oman time	heard awarded to Gunvor around $30/MMBtu FOB
Tender	Ichthys LNG - Ichthys LNG	Sell	(13-Nov-21 - 17-Nov-21)	1 DES or FOB	25-Oct-21	27-Oct-21	27-Oct-21	FOB or DES cargo, 13-17 November loading. The tender closes on Oct. 27, noon Tokyo time. Validity until 7 PM Tokyo time (7 hour validity).	heard awarded at approximately $31/MMBtu FOB
Tender	Darwin LNG - Darwin	Sell	(01-Dec-21 - 03-Dec-21)	1 DES or FOB		28-Oct-21		Dec 1-3 load or Dec 14-17 DES JKTC	heard awarded at approximately $31/MMBtu FOB
Tender	Petronet - Dahej	Buy	16-Nov-21 - 30-Nov-21	1 DES	21-Oct-21	27-Oct-21	28-Oct-21	Seller to nominate delivery window for H2 Nov, fixed price only, DES Dahej or Kochi, 3.2 Tbtu	heard not awarded
Tender	Egas - Egypt	Sell	(13-Nov-21 - 25-Nov-21)	2 DES or FOB		26-Oct-21	26-Oct-21		Heard awarded approximately $28s/MMBtu
Tender	PTT - Map Ta Phut	Buy	27-Nov-21 - 05-Dec-21	2 DES	25-Oct-21	26-Oct-21	26-Oct-21	Seeking two cargoes for Nov. 27-29 delivery and Dec. 3-5 delivery. Closes on 4 PM Thailand time on Oct. 26, and has a 3 hour validity until 7 PM Thailand time.	Heard awarded around $33-$34/MMBtu
Tender	IEASA - Escobar	Buy	19-Nov-21 - 19-Dec-21			26-Oct-21		Two cargo buy tender for Nov. 19 & Dec. 19 delivery	
Tender	Novatek - Yamal	Sell	05-Dec-21 - 31-Mar-22	3 DES		21-Oct-21		Dec. 5-23, Jan. 3-21, and March 25-31 delivery	Heard partially awarded
Tender	Sakhalin Energy - Sakhalin	Sell	(01-Dec-21 - 01-Dec-21)	1 DES or FOB		21-Oct-21	22-Oct-21		heard awarded at approximately $34/MMBtu
Tender	Angola LNG - Angola LNG	Sell	05-Nov-21 - 19-Nov-21	1 DES		25-Oct-21	26-Oct-21	Furthest to India, onboard Seri Balqis	

record high $56.33/MMBtu on Oct. 6, with prices remaining strong and volatile through October and into November. The JKM was assessed at $31.72/MMBtu on Nov. 15, up 373% compared with the same date a year ago.

TURKEY'S LNG IMPORTS BY SOURCE (2021 TO DATE)



Source: S&P Global Platts Analytics

Donmez said earlier this month that Turkey had enough diversified supply to meet the increased gas demand.

However, a number of Turkey's long-term contracts have either expired this year or are due to expire soon, prompting some concern over its ability to meet the growing demand.

A long-term contract for 1.3 Bcm/year of Nigerian LNG imports expired without renewal at the end of October, and Botas's 4 Bcm/year contract with Russia's Gazprom is set to expire at the end of 2021.

In addition, four Russian contracts with private Turkish importers totaling another 4 Bcm/year are with companies that hold import licenses due to expire between the end of February 2022 and the end of December 2022.

Russian talks

Bayraktar said Ankara was in discussions with Moscow on its long-term gas arrangements. "We are in talks to renew the contracts," he said.

Asked what volumes Turkey was looking to secure, Bayraktar said: "Enough volume to fill the existing pipelines — TurkStream and Blue Stream."

"Blue Stream is already contracted so it is continued. For TurkStream, the available capacity will be fulfilled," he said.

Blue Stream carries up to 16 Bcm/year of Russian gas to Turkey under a long-term contract with Botas that expires at the end of 2025.

However, the 8 Bcm/year of TurkStream contracts — which were initially for delivery via the Trans-Balkan line — are soon to expire.

The Turkish string of TurkStream has a capacity of 15.75 Bcm/year, which when combined with Blue Stream means direct Russia-Turkey supply capacity of 31.75 Bcm/year.

In late October, Gazprom Export CEO Elena Burmistrova said the company expected to supply an estimated 24-25 Bcm to Turkey in 2021. That compares with just 16.4 Bcm of sales in 2020.

Turkey imports gas via pipeline from Russia, Azerbaijan, and Iran, as well as via LNG.

Turkey's term LNG supply comes from its remaining long-term contract with Algeria's Sonatrach for 4.4 Bcm/year. — *Dania Saadi, Stuart Elliott*

SOUTH AMERICA ($/MMBtu), NOV 15

DES Brazil Netforward		
DES Brazil (Dec)	LEBMH01	27.920
DES Brazil vs NWE Fuel Oil Derivative	LAARM01	15.280
DES Brazil vs DES MED LNG	LASWM01	0.636
DES Brazil vs Dated Brent	LADBM01	13.863
DES Brazil vs Henry Hub (16:30 London)	LAHHM01	23.022
DES Brazil vs JKM (16:30 London)	LAJKM01	-3.803
DES Brazil vs NBP (16:30 London)	LABPM01	0.176

NORTH AMERICAN FEEDGAS ($/MMBtu), NOV 12

Daily average US LNG feedgas cost	ALNFG00	4.755
30-day moving average US LNG feedgas cost	ALNUS00	5.260
Daily average USGC LNG feedgas cost	ALNFH00	4.754
30-day moving average USGC LNG feedgas cost	ALNUG00	5.288

Export facility		Estimated feedgas cost
Sabine Pass	ALNFA00	4.787
Corpus Christi	ALNFB00	4.714
Cove Point	ALNFC00	4.726
Cameron	ALNFD00	4.786
Freeport	ALNFE00	4.641
Elba Island	ALNFF00	5.010

Facility feedgas costs represent a calculation derived from S&P Global Platts' North American gas spot price indices at the hub(s) from which feedgas would be procured most economically for the export facility. The average summary costs are an average of the relevant export facilities' feedgas costs weighted by Platts Analytics' daily estimated volume delivered to each facility.

US CARGO CANCELLATIONS, NOV 15

Dec-21	0
Nov-21	0
Oct-21	0
Sep-21	0
Aug-21	0
Jul-21	0
Jun-21	0
May-21	0
Apr-21	0
Mar-21	0
Feb-21	5
Jan-21	2

The figures are collected from market sources.

NATURAL GAS FUTURES ($/MMBtu), NOV 15

NYMEX HH Singapore close	(Dec)	AAPSD00	4.818
NYMEX HH Singapore close	(Jan)	AAPSE00	4.918
ICE NBP Singapore close	(Dec)	AAPSF00	27.013
ICE NBP Singapore close	(Jan)	AAPSG00	27.930
NYMEX HH London close	(Dec 21)	AASYN00	4.898
NYMEX HH London close	(Jan 22)	AASYO00	4.987
ICE NBP London close	(Dec 21)	AASYR00	27.744
ICE NBP London close	(Jan 22)	AASYS00	28.388
NYMEX HH US close	(Dec 21)	NMNG001	5.017
NYMEX HH US close	(Jan 22)	NMNG002	5.104

MARINE FUEL LNG BUNKER, NOV 15

	$/MMBtu		$/mt (Oil)		$/mt (LNG)	
Singapore	LNBSG00	31.223	LNBSM00	1206.550	LNBSF00	1623.596
	Eur/MWh		**$/mt (Oil)**		**$/mt (LNG)**	
Rotterdam	LNBRT00	79.600	LNBRM00	1029.476	LNBRF00	1386.788

MMBtu to $/mt (oil) factor: 38.643; MWh to $/mt (oil) factor: 11.322; MMBtu to $/mt (LNG) factor: 52.000.

Belarus to meet new EU sanctions with 'tough response': Lukashenko

- **EU broadens scope of sanctions package against Minsk**
- **Lukashenko had hinted at Russian gas transit block**
- **Putin says Lukashenko may have 'overreacted'**

The president of Belarus, Alexander Lukashenko, on Nov. 15 vowed a "tough response" to an EU move to broaden its sanctions against Minsk over the current migrant crisis, having already hinted last week he could block Russian gas supplies to Europe.

The EU Council on Nov. 15 approved an amended set of sanctions against Belarus enabling the EU to target individuals and entities that facilitate the "illegal crossing" of the EU's external borders.

"We will respond to the sanctions. This is not even up for discussion," Lukashenko was quoted as saying Nov. 15 by state news agency Belta.

Last week, Lukashenko said Minsk could consider halting Russian gas deliveries to Europe in retaliation for new EU sanctions.

Without explicitly mentioning gas transit again on Nov. 15, Lukashenko moved to raise the stakes in his comments.

"They are trying to intimidate us with sanctions. Okay, we will see. They think that I did not mean what I said. Nothing of the kind. We will defend ourselves," he said.

Lukashenko also denied Belarus was deliberately stoking the migrant crisis, which has seen thousands of migrants stranded on the border between Belarus and Poland.

"Facilitating a migration flow through Belarus is more trouble than it is worth. We have never done this and do not intend to do it," Lukashenko said.

Josep Borrell, the EU's High Representative for Foreign Affairs and Security Policy, said Nov. 15 the new sanctions decision against Belarus reflected the "determination by the EU to stand up to the instrumentalization of migrants for political purposes".

"We are pushing back on this inhuman and illegal practice," Borrell said.

Russia stance

Russia, meanwhile, has said the Belarus stance was not discussed ahead of time with Moscow and that it would continue to meet all of its contractual gas supply obligations.

Russian President Vladimir Putin, speaking in an interview Nov. 13

(continued on page 9)

PLATTS WIM RLNG DAILY PRICES, NOV 15

		$/MMBtu	Rupee/MMBtu
Ex-Terminal			
Dahej	RLEDA00	31.93	RLEIA002300.47
Hazira	RLEDB00	31.09	RLEIB002312.03
Dabhol	RLEDC00	31.03	RLEIC002307.34
Mundra	RLEDE00	31.06	RLEEI002310.07
Kochi	RLEDD00	31.56	RLEDI002347.25
Average	RLEDF00	31.13	RLEIF002315.43
Location			
Ahmedabad	RLDDJ00	31.43	RLDIJ002337.60
Morbi	RLDDK00	31.56	RLDIK002347.20
Panvel	RLDDL00	31.69	RLDIL002356.66
Dabhol	RLDDC00	31.69	RLDIC002356.66
Vijaipur	RLDDM00	31.62	RLDIM002351.29
Kota	RLDDN00	31.62	RLDIN002351.29
Chhainsa	RLDDO00	31.68	RLDIO002356.07
Jagdishpur	RLDDP00	31.68	RLDIP002356.07
New Delhi	RLDDQ00	31.68	RLDIQ002356.07
Koottanad	RLDDR00	32.21	RLDIR002395.17
Kakinada	RLDDS00	32.30	RLDIS002401.80
Average	RLDDT00	31.74	RLDIT002360.53

Prices are net-forward calculations derived from the Platts WIM and exclude VAT and CST sales taxes. Delivered prices represent the cost of delivery from the nearest connected LNG terminal via pipeline.

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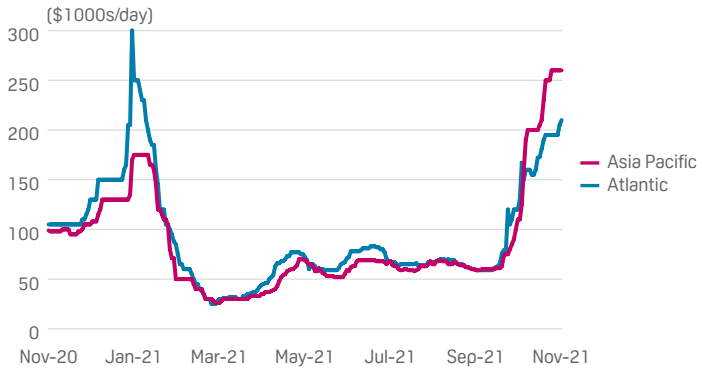
SHIPPING PRICES

SHIPPING RATES, NOV 15

		$/day
Asia Pacific day rate	AARXT00	260,000
Atlantic day rate	AASYC00	210,000
TCR Australia-Japan	ATCRA00	260,000.00
TCR USG-NWE	ATCRB00	210,000.00
TCR USG-Japan	ATCRC00	210,000.00
		$/MMBtu
PLF1 Middle East-Japan/Korea	AAUUA00	3.88
PLF2 Middle East-NWE	AAUTE00	4.16
PLF3 Trinidad-NWE	AAUUC00	1.99

SHIPPING RATES



Source: S&P Global Platts

SHIPPING CALCULATOR, NOV 15

	Australia-Japan/Korea	Middle East-India
Ship size (mt)	72980.77	72980.77
Trip length (days)	9	3
Carrier day rate ($/day)	260000	260000
Day rate cost ($/MMBtu)	1.50	0.63
Boil-off cost	0.64	0.21
Supplementary boil-off cost ($/MMBtu)	0.20	0.06
Cost of voyage* ($/MMBtu)	2.44	0.95

*Includes port cost.

FREIGHT ROUTE COSTS, NOV 15 ($/MMBtu)

Asian discharge ports

		Japan/Korea		South China/Taiwan		West India
Middle East	AAUUA00	3.88	AAUSH00	3.39	AAUSP00	0.95
Australia (Dampier)	AAUSA00	2.44	AAUSI00	1.96	AAUSQ00	2.35
Australia (Gladstone)	ACABA00	2.45	ACABB00	2.69	ACABC00	3.78
Bontang	AOJKA00	1.69	AOCTA00	1.22	AOWIA00	2.32
Bintulu	ABJKA00	1.72	ABCTA00	1.02	ABWIA00	2.11
Singapore	ASJKA00	1.92	ASCTA00	1.22	ASWIA00	1.62
Tangguh	ATJKA00	1.68	ATCTA00	1.44	ATWIA00	2.77
Trinidad via Suez	AAUSB00	7.81	AAUSJ00	7.33	AAUSR00	5.02
Trinidad via Panama	AAUXB00	5.41	AAUZB00	6.58		
Trinidad*	AAUZC00	5.41	AAUZD00	6.58		
Nigeria	AAUSC00	6.14	AAUSK00	5.44	AAUSS00	3.93
Algeria	AAUSD00	5.70	AAUSL00	5.24	AAUST00	3.11
Belgium	AAUSE00	6.63	AAUSM00	5.93	AAUSU00	3.74
Peru	AAUSF00	5.42	AAUSN00	6.21	AAUSV00	6.76
Russia	AAUSG00	0.98	AAUSO00	1.45	AAUSW00	3.73
Spain	ACAAA00	5.96	ACAAB00	5.26	ACAAC00	3.35
Norway	ACAAH00	7.61	ACAAI00	6.65	ACAAJ00	4.62
USGC*	LAUVA00	5.68	LAUVB00	6.86	LAUVC00	5.50
USGC via Panama	LAUVI00	5.68	LAUVL00	6.86		
USGC via Suez	LAUVJ00	8.59	LAUVM00	7.61	LAUVO00	5.50
USGC via Cape	LAUVK00	8.85	LAUVN00	8.10	LAUVP00	6.86

EMEA discharge ports

		South West Europe		North West Europe		Kuwait/UAE
Middle East	AAUSX00	3.49	AAUTE00	4.16	LMEMM00	0.52
Australia (Dampier)	AAUSY00	5.42	AAUTF00	6.12	LMEMN00	2.83
Australia (Gladstone)	ACABD00	6.92	ACABE00	7.65	ACABI00	4.28
Trinidad	AAUSZ00	2.02	AAUUC00	1.99	LMEMP00	4.59
Nigeria	AAUTA00	2.25	AAUTG00	2.42	LMEMQ00	4.18
Algeria	AAUTB00	0.49	AAUTH00	1.04	LMEMR00	2.71
Belgium	AAUTC00	0.87			LMEMS00	3.54
Peru	AAUTD00	5.67	AAUTI00	5.88	LMEMT00	7.30
Russia	AAUUB00	6.87	AAUTJ00	7.35	LMEMU00	5.22
Spain			ACAAD00	0.87	LMEMV00	2.94
Norway	ACAAK00	1.47	ACAAL00	0.86	LMEMW00	4.20
Murmansk			AARXW00	1.03		
USGC*	LAUVD00	2.66	LAUVE00	2.63	LMEMX00	5.29
USGC via Suez					LMEMY00	5.29
USGC via Cape					LMEMZ00	6.64

Americas discharge ports

		US Atlantic Coast		Argentina		Brazil
Middle East	AAUTK00	4.56	AAUTS00	5.09	ACAAP00	5.86
Australia (Dampier)	AAUTL00	5.73	AAUTT00	5.11	ACAAQ00	6.14
Australia (Gladstone)	ACABF00	5.55	ACABH00	4.40	ACABG00	5.40
Trinidad	AAUTM00	1.00	AAUTU00	2.36	ACAAR00	1.60
Nigeria	AAUTN00	2.44	AAUTV00	2.59	ACAAS00	2.23
Algeria	AAUTO00	1.63	AAUTW00	2.99	ACAAT00	2.63
Belgium	AAUTP00	1.47	AAUTX00	3.40	ACAAU00	3.03
Peru	AAUTQ00	4.73	AAUTY00	2.29	ACAAV00	3.48
Russia	AAUTR00	7.16	AAUTZ00	6.56	ACAAW00	9.20
Spain	ACAAE00	1.35	ACAAF00	3.02	ACAAG00	2.45
Norway	ACAAM00	1.64	ACAAN00	4.05	ACAAO00	3.87
USGC*			LAUVG00	3.62	LAUVH00	2.84

*Most economic.

All values calculated based on prevailing spot market values during the day for LNG, bunker fuel and ship chartering. No route cost is calculated for Zeebrugge to NW Europe, or Spain to SW Europe. Other routes appear blank on days when a public holiday in one or another location means underlying values are not published. Detailed assessment methodology, including assumed route times and underlying values, is found on www.platts.com.

with state broadcaster Rossiya24, said he had not been been informed by Lukashenko about the transit threat.

"I have twice talked with [Lukashenko] recently, and he never told me about it, did not even hint," Putin said.

"But he probably can [block gas supplies]. Although there is nothing good in this, and I, of course, will talk to him on this topic," he said.

"It is possible he just overreacted. This would cause great damage to the energy sector of Europe and would not contribute to the development of our relations with Belarus."

Putin went on to say that Lukashenko — as the head of a transit country — could in theory order Russian gas supplies to Europe to be cut.

"However, this would be a violation of our transit contract, and I hope it will not come to this," Putin said.

The gas transmission system in Belarus is owned and operated by Gazprom Transgaz Belarus, a 100% subsidiary of Russia's state-controlled Gazprom.

Formerly known as Beltransgaz, the Belarus state previously held 50% of the company, but Gazprom bought the stake in 2011, bringing its ownership to 100%.

Belarus gas transit

Belarus transits Russian gas via the Yamal-Europe pipeline into Poland and onto Germany, and is a key route for Russian deliveries to Europe.

Flows into Poland from Belarus have averaged 76 million cu m/d so far in 2021, according to data from S&P Global Platts Analytics, though deliveries began to be curtailed in August and have remained volatile since.

The veiled threat from Lukashenko comes as European gas prices remain at sustained highs, due in part to lower-than-expected imports from Russia and low storage stocks.

TTF DAY-AHEAD STABILIZES AFTER EXTREME VOLATILITY

Source: S&P Global Platts

According to S&P Global Platts price assessments, the TTF day-ahead contract hit an all-time high on Oct. 5 of Eur116.10/MWh ($133/MWh) and has remained volatile through the remainder of October and into November.

The TTF day-ahead price was assessed at Eur74.55/MWh on Nov. 12, up 436% compared with the same assessment a year earlier. — *Stuart Elliott, Anastasia Dmitrieva*

Japan's JERA takes 25.7% stake in US Freeport LNG, expects extra 820,000 mt/year equity access

- **JERA's equity participation in addition to Freeport Train 1 stake**
- **JERA currently procures 2.32 million mt/year of Freeport LNG**
- **Train 4 with 5.35 mil mt/year capacity scheduled for FID in 2022**

Japan's largest power generation company JERA said Nov. 15 it has concluded an agreement to take a 25.7% stake in Freeport LNG Development, or FLNG, under which it expects to get equity access to 820,000 mt/year of supply capacity from the US Freeport LNG project as part of its efforts to ensure supply to Japan during emergencies.

JERA's expansion of its holding is aimed at ensuring LNG supply to Japan amid a tight market outlook in Asia over the next few years as well as for expected LNG demand growth in the region, JERA Americas Holdings Chief Strategy Officer Izumi Kai told an online press briefing.

"While we are looking at expected LNG demand growth in Asia in the future, of course we are also targeting to get easier access to surplus LNG cargoes, including for our response to emergencies, amid tight [supply] outlooks for Japan and Asia for this year and the next [few years]," Kai said.

The move comes at a time when Japanese power utilities are working to ensure LNG supply for the upcoming winter. Japan experienced power shortages last winter as demand surged during extreme cold spells in January, with local utilities forced to restrict gas-fired power generation due to low LNG stocks.

"While there is a possibility of tightening supply and demand in the future, we believe it is important to absolutely secure volumes in such

situations," Kai said. "For instance, we could be in a situation where it is difficult to secure spot cargoes in Asia and Oceania like in the past few months, when a lot of US supplies headed to Europe and Asia," he said.

The company will acquire the 25.7% stake in FLNG held by infrastructure fund Global Infrastructure Partners for $2.5 billion, which will give it access to the entire Freeport LNG project. The Texas-based project currently has three trains with a total capacity of around 15.45 million mt/year.

JERA already has a 25% stake in the FLNG Train 1 and procures 2.32 million mt/year of LNG from the Freeport LNG project.

Following necessary approvals and authorization procedures to complete in early 2022, JERA will also work with FLNG to advance new LNG projects, including production capacity expansion and the development of Train 4.

Train 4 is currently planned to have a capacity of 5.35 million mt/year and reach a final investment decision in 2022, giving JERA an equity access of 1.37 million mt/year based on its 25.7% stake in FLNG, which has 100% of the planned train, Kai said.

Train 4 is expected to start up in the early second half of the 2020s if the FID is sanctioned as scheduled in the next year, Kai said.

Following the deal, JERA also expects to get additional equity access of 820,000 mt/year of Freeport LNG supply capacity from the unsold 13% of output not bound for long-term supply contracts from the existing three trains and an increase of 3 million mt/year production capacity at the three trains from revamp works in 2022, Kai said. — *Takeo Kumagai*

No Russian gas auctions scheduled on Gazprom Export's ESP for Nov 15-19

- **Second consecutive week of no scheduled sales**
- **No ESP sales reported since Oct. 13**
- **Offer had been limited to long-term sales**

Russia's Gazprom Export has again failed to schedule any auctions on its Electronic Sales Platform for the week of Nov. 15-19, the second consecutive week that no auctions will be held.

In an update on its website Nov. 15, the company said there were "no planned sales sessions" for the week Nov. 15-19.

Gazprom Export launched the ESP in September 2018 as a tool to sell surplus gas into Europe outside of its traditional long-term contract model and has sold more than 51 Bcm of gas since its launch.

However, sales have slowed in recent months and since September all gas offered has been for longer-term delivery in either 2022 or 2023 to just two delivery points — the German THE hub or the Austrian virtual trading point.

No sales have been recorded since Oct. 13 despite auctions being held across the remainder of the month.

It is unclear whether no sales were made at those auctions or whether Gazprom Export has not updated the results, with the company unable to comment further.

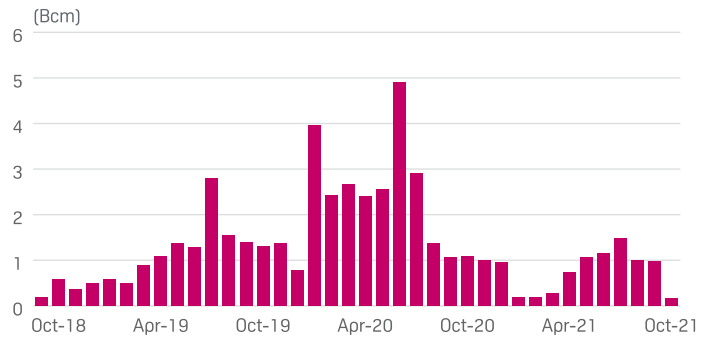
The last scheduled auctions were for the week Oct. 25-29, with gas available for sale for delivery in either Q3 2022 or for Calendar Year 2023 to the THE and Austrian VTP hubs.

No auctions were scheduled for the week of Nov. 1-5 due to a public holiday in Russia.

October sales

Sales in October, according to the latest results, totaled just 168 million cu m, which is the lowest ever volume sold in a calendar month, lower even than the sales in the first month of operation in September 2018.

RECORDED ESP GAS SALES IN OCTOBER



Source: Gazprom Export

Gazprom has come in for criticism for not increasing supply to Europe at a time of sky-high gas prices, but the company has repeatedly said it has been meeting all of its customer obligations in full.

S&P Global Platts assessed the TTF day-ahead price at a record high of Eur116.10/MWh on Oct. 5, with price volatility continuing through October and into November.

The TTF day-ahead price was assessed at Eur74.55/MWh on Nov. 12, up by 436% compared with the same assessment a year ago. — *Stuart Elliott*

Russia's Gazprom sees non-CIS gas sales slide to new 2021 low in November

- **November deliveries averaged just 400 million cu m/d**
- **Total supply to non-CIS at 164.8 Bcm in Jan. 1-Nov. 15**
- **Supply growth slowed this month in almost all markets**

Gazprom's gas sales in non-CIS countries in November to date averaged just 400 million cu m/d, according to an S&P Global Platts analysis of the latest sales data published by the Russian gas group Nov. 15.

That is easily the lowest average monthly volume so far in 2021, with the previous low seen in October at 433 million cu m/d, according to Platts calculations.

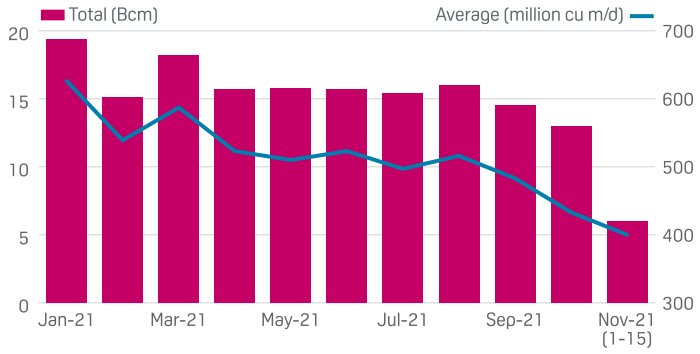
In its regular sales update, Gazprom said total deliveries to export markets — excluding countries of the former Soviet Union — in the period Jan. 1-Nov. 15 were 164.8 Bcm.

That is just 6 Bcm higher than the sales volume reported for the first 10 months of the year of 158.8 Bcm.

The data showed sales slowed in November in most of Gazprom's key markets, including Germany and Turkey.

Gazprom's sales in the Far Abroad — traditionally Europe plus Turkey minus the countries of the former Soviet Union — reached an all-time high of 201 Bcm in 2018.

GAZPROM'S NON-CIS GAS SALES IN YEAR TO DATE



Source: Gazprom, S&P Global Platts

However, the sales data are now said to include China, with a comparison of the data for the first six months tallying with Gazprom's interim report on first-half sales in non-CIS countries plus China.

Gazprom has repeatedly said it expected its gas sales in Europe and Turkey for 2021 as a whole to total 183 Bcm, a level excluding Chinese deliveries.

Without China, the non-CIS deliveries in the period Jan. 1-Nov. 15 would be closer to 157 Bcm, according to Platts estimates.

November lows

Gazprom has come in for criticism for not increasing gas supplies via Ukraine and Belarus to help ease sky-high gas prices, but the company has said its focus remained on meeting its European customer obligations.

S&P Global Platts assessed the TTF day-ahead price at a record high of Eur116.10/MWh on Oct. 5, with price volatility continuing through October and into November.

The TTF day-ahead price was assessed at Eur74.55/MWh on Nov. 12, up by 436% compared with the same assessment a year ago.

Gazprom last week said it had begun to refill five of its storage sites in Europe having completed its domestic storage injection program on Nov. 8.

It has been producing significantly more gas in 2021 than it did a year ago. It said Nov. 15 that production was 445 Bcm in the period Jan. 1-Nov. 15, an increase of 15.2% year on year.

In August, Gazprom said it expected to produce 510 Bcm of gas in 2021, which would be a 10-year high.

Supplies to the domestic Russian market increased by 16.5%, or by 29.6 Bcm, in the period Jan. 1-Nov. 15, it said.

Biggest markets

In Germany — comfortably the gas group's biggest export market — sales rose by 19.6% year on year, Gazprom said, without providing actual volumes.

It said it had now supplied more gas to Germany so far in 2021 than it did in the whole of last year, when sales were 45.8 Bcm.

However, sales slowed in November in Germany. The year-on-year increase for the first 10 months of 2021 was 23.4%, but is now 19.6%.

Sales in Turkey also rose strongly in the year to date, increasing by 98.1%, Gazprom said. But the growth rate was again lower compared with that reported for the first 10 months of 2021 of 110.4%.

Romania (up 247.1%) and Serbia (up 92.9%) also saw significant year-on-year increases for the period Jan. 1-Nov. 15, it said, though both saw slower growth rates than for the January-October period.

Other countries saw growth in sales, including Poland (7.3%), Greece (13.7%), Italy (18.3%), Bulgaria (48.2%), and Finland (10.8%).

"The countries to which Gazprom has already supplied more gas than in the whole of 2020 (Turkey, Bulgaria, Romania, and Serbia) are now joined by Germany and Italy, the largest gas consumers of Russian gas in Europe," it said.

Gas sales data from Gazprom includes gas supplied by pipeline and from owned capacity in European gas storage sites.

Gazprom also said its supplies to China via the Power of Siberia gas pipeline continued to increase.

"Since the beginning of the month, supplies have exceeded Gazprom's daily contractual obligations by more than 30% on a daily basis," it said.

"On Nov. 7, supplies at the request of the Chinese side reached a new maximum — they were 35.4% higher than Gazprom's daily commitments," it said. — *Stuart Elliott*

SOUTH KOREA DATA: Oct LNG import growth eases to 1.4% as prices rise

South Korea's LNG imports rose 1.4% year on year to 3.902 million mt in October, customs data released Nov. 15 showed, marking the sixth consecutive month of increase but easing sharply from much stronger growth in previous months amid a rise in global prices.

The country's LNG imports had surged 26.2% year on year in September, 77.8% in August and 70.6% rise in July, earlier customs data showed.

However, October imports were up 5.4% from September, driven by solid demand for power generation and economic recovery as pandemic-related movement restrictions eased.

Over January-October, South Korea's LNG imports rose 19% year on year to 38.237 million mt, the data showed.

The country's LNG imports began to rebound in January after a sustained decline over April-December 2020 on the back of stronger demand for power generation due to the temporary shutdown of several coal-fired power plants and nuclear reactors, with imports of 5.161 million mt in February the highest monthly volume since 1986.

South Korean importers, including state-run Korea Gas Corp. and private power utility and city gas provider SK E&S, paid $2.606 billion for the shipments in October, up from $1.061 million a year earlier, according to customs officials.

This means South Korean importers paid an average $12.90/MMBtu in October, given 1 mt equals 51.9/MMBtu, up from $5.31/MMBtu a year earlier and $11.0/MMBtu in September.

Import costs rise

South Korean LNG importers have been less affected by soaring spot prices because almost 80% of their purchases are based on long-term contracts linked to international oil prices, according to the importers.

However South Korea's LNG import bills that had declined earlier in the year have risen each month since May due to higher global crude oil and LNG spot prices.

The importers paid an average $10.30/MMBtu in August, $9.59/MMBtu in July, $8.89/MMBtu in June, $7.86/MMBtu in May, $7.42/MMBtu in April, $8.44/MMBtu in March, $10.24/MMBtu in February, $7.96/MMBtu in January, $6.9/MMBtu in December last year, $6.01/MMBtu in November and $5.3/MMBtu in October.

Of the total LNG imports in October, 874,449 mt was from long-time biggest supplier Qatar, down 6% on the year, marking the first decline after five consecutive months of increases, the customs data showed. State-run Korea Gas Corp. signed a deal with Qatar Petroleum in July to import 2 million mt/year of LNG for 20 years from 2025; its three existing purchase contracts with Qatar worth 9.02 million mt/year are set to expire from 2024 to 2032.

LNG imports from the US rose 31.7% year on year to 677,829 mt in October, rising for the seventh straight month.

Imports from Australia rose 29.8% over the same period to 900,735 mt in October, marking a fifth consecutive month of increase.

The rise in South Korea's LNG imports was attributable to solid demand during the shutdown of several nuclear reactors for maintenance, a Kogas official said.

Kogas, which has a monopoly on domestic natural gas sales, sold 26.613 million mt over January-September, up 18.3% year on year, according to Kogas data compiled by S&P Global Platts.

SOUTH KOREA'S LNG IMPORTS (mt)

Month	2021	2020	Outright Change (Y/Y)	(%)
Jan	4,430,687.60	4,145,134.20	285,553	6.9
Feb	5,161,096.90	4,721,340.40	439,757	9.3
Mar	4,193,949.30	3,543,338.50	650,611	18.4
Apr	2,836,171.60	3,092,233.50	-256,062	-8.3
May	3,395,233.20	2,961,927.10	433,306	14.6
June	3,137,769.30	2,580,410.10	557,359	21.6
July	4,024,458.20	2,359,384.30	1,665,074	70.6
Aug	3,479,082.50	1,956,397.40	1,522,685	77.8
Sep	3,702,367.90	2,934,536.30	767,832	26.2
Oct	3,901,533.00	3,848,452.00	53,081	1.4
Total	**38,237,419.80**	**32,143,153.70**	**6,094,266**	**19.0**

Source: Korea Customs Service

— *Charles Lee*

Australia's Woodside to sell 49% stake in Pluto LNG Train 2, paving way for FID

Australia's Woodside Petroleum Nov. 15 said it has agreed to sell a 49% stake in Pluto Train 2 at the Pluto LNG project in the northwest of Western Australia to US-based Global Infrastructure Partners, which paves the way for a final investment decision on the giant expansion project by year end.

The terms of the deal are that if the total capital expenditure incurred in the development of Pluto Train 2 is less than $5.6 billion, GIP will pay Woodside an additional amount equal to 49% of the underspend, Woodside said in a statement.

If there is a cost overrun, Woodside will fund up to $835 million in respect of a 49% share, and delays to the expected startup of production could see Woodside required to make payments to GIP.

Pluto Train 2, which will have a capacity of around 5 million mt/year and be supplied with gas from the proposed Scarborough project, is targeted to load its first LNG cargo in 2026. The train would add to Woodside's existing 4.9 million mt/year Pluto train.

The deal also includes provisions for GIP to be compensated for exposure to additional Scope 1 emissions liabilities above agreed baselines. The infrastructure investor can also sell back its 49% interest to Woodside should the status of key regulatory approvals materially change, Woodside said.

"Pluto Train 2 will be one of Australia's most efficient LNG trains and with Scarborough gas containing virtually no carbon dioxide, this is an attractive investment in a decarbonizing world," Woodside's CEO Meg O'Neill said in the statement.

"The sale of the interest in Pluto Train 2 is a significant milestone as we progress towards a final investment decision on our Scarborough development, further de-risking this globally competitive investment," she added.

Pluto Train 1 at the integrated offshore and onshore LNG processing facility was delivered in 2012. The expansion will include the construction of Pluto Train 2, associated domestic gas processing facilities, supporting infrastructure and modifications to Pluto Train 1 to allow it to process Scarborough gas, Woodside said in the statement.

The company said it was targeting emissions reductions of 30% by 2030 and net zero by 2050 at Pluto LNG, including Pluto Train 2 and the proposed development of the Scarborough gas resource.

— *Nathan Richardson*

Italy's Eni says floating Mozambique LNG vessel ready for sail-away

- **To begin production in second half of 2022**
- **To reach capacity a few months after startup**
- **Eni also producing 2.8 Bcf/d at Egypt's Zohr**

Italy's Eni said Nov. 15 its Coral-Sul floating LNG production vessel was ready for sail-away to its location offshore Mozambique, with first LNG still expected in the second half of 2022.

In a statement, Eni said it held a naming and sail-away ceremony Nov. 15 at the Samsung Heavy Industries shipyard in Geoje, South Korea, for the vessel, the first floating LNG facility ever to be deployed in the deep waters of the African continent.

The 3.4 million mt/year FLNG will now be towed and moored at its operating site, Eni said, where it will access the 450 Bcm of gas located in the Coral reservoir.

In an interview on Nov. 10 in Dubai, Guido Brusco, Eni's Executive Vice President for Sub-Saharan Africa, had said the Coral project was going "very well."

"The ship will soon start sailing toward Mozambique and we are

planning the first production in second half of next year," Brusco said.

Production at the LNG site is expected to reach full capacity within a few months of startup and maintain plateau output for years to come, the company said.

Coral LNG is one of three developments in Mozambique, but is the only offshore LNG project, meaning it has been shielded from the Islamist insurgency that began in October 2017.

More than 30 million mt/year of LNG production capacity is envisaged in Mozambique, but France's TotalEnergies in April declared force majeure on work at its 13.1 million mt/year Mozambique LNG project after attacks on the nearby town of Palma.

ExxonMobil's planned 15.2 million mt/year Rovuma LNG project also remains on hold.

Zohr production

Brusco said Africa remained a "key" continent for Eni, with production of more than 900,000 b/d of oil equivalent last year.

It also operates the supergiant Zohr field offshore Egypt, which started up at the end of 2017. According to Eni, there are no technical issues or difficulties encountered at Zohr so far.

"Zohr is producing above its declared commercial quantities of 2.7 Bcf/d. We have produced this year 2.8 Bcf/d plus," Brusco said.

Declared commercial quantities from the field are those agreed with the Egyptian government.

Eni holds a 50% stake in the project, with Russia's Rosneft holding 30% and BP and the UAE's Mubadala Petroleum having 10% each.

Zohr has been instrumental in helping Egypt resume large-scale LNG exports in recent years, after Cairo had turned to importing LNG in 2015 to meet a growing supply-demand gap. — *Dania Saadi, Stuart Elliott*

TAIWAN DATA: LNG imports rise 11.1% on year in Sept

Taiwan imported 1.64 million mt of LNG in September, down 0.2% on the month but up 11.1% on the year, latest data from the Taiwan Bureau of Energy showed.

This is also the second consecutive month-on-month drop in the country's LNG imports, according to the data, which market participants attributed to lower local consumption, together with higher import costs during the period.

Taiwan consumed a total of 2.08 billion cubic meters of natural gas in September, down 2.4% month on month, marking the second month-on-month drop in a row, data from Taiwan Energy Bureau showed.

LNG demand from Taiwan's power generation and industrial sectors, which accounted for around 97% of the region's total LNG consumption, fell by 2.3% and 3.7%, respectively, on the month in September, data from the bureau showed.

Over January-September, Taiwan imported a total of 14.21 million mt of LNG, up 7.9% year on year, while its LNG consumption was also up 7.5% during the same period, the data showed.

The year-on-year increase in gas demand and LNG imports is due to the easing impact of the pandemic on its economy.

Australia and Qatar remained the top LNG suppliers to Taiwan in September and over the first nine months of the year.

The increase in Taiwan's LNG imports over the past nine months was mainly made of volumes from Australia and the US, which were up 1.2 million mt and 725,885 mt, respectively, from levels seen in the same period in 2020, according to the data.

Taiwan's state petroleum company CPC, which holds a 5% equity stake in the Prelude FLNG project in northern Australia, has been receiving LNG from the Inpex-operated Ichthys LNG plant since November 2020.

CPC has also begun receiving LNG cargoes under a 25-year deal with the US-based Cheniere since Jan. 10. Under the agreement, Cheniere would supply 2 million mt/year or around 30 shipments/year of LNG to CPC starting from this year, according to CPC.

TAIWAN LNG IMPORTS IN SEPT 2021 (MT)

Countries	Sep-21	Sep-20	Change (%)	Aug-21	Change (%)
Qatar	444,380	454,170	-2.2	361,733	22.8
Indonesia	126,090	168,729	-25.3	120,002	5.1
Malaysia	62,210	0	NA	122,648	-49.3
Papua New Guinea	78,114	149,756	-47.8	163,389	-52.2
Brunei	60,111	65,544	-8.3	0	NA
Australia	488,195	435,467	12.1	557,783	-12.5
Russia	128,549	202,790	-36.6	0	NA
United States	177,777	0	NA	255,573	-30.4
Others	74,640	0	NA	61,459	21.4
Total	**1,640,065**	**1,476,457**	**11.1**	**1,642,587**	**-0.2%**

Source: Taiwan Bureau of Energy

— *Staff*

Vietnam's PV Gas to import first LNG cargo in 2022

Vietnam's state-controlled PV Gas plans to import its first LNG cargo in 2022 as construction of its first 1 million mt/year import terminal is well under way, it said in a statement released Nov. 12.

The company began construction of the terminal at Ba Ria-Vung Tau province in October 2019. Currently, 90% of the work at the project has been completed, with PV Gas targeting to put the terminal into operation by the third quarter of 2022.

Associated projects, such as the LNG fueling station at Thi Vai and the pipeline connecting the Thi Vai terminal and Phu My Industrial Park in Ba Ria-Vung Tau, are in progress, PV Gas said.

Power plants will consume roughly 70% of PV Gas' LNG volume, with the remainder used by other consumers such as petrochemical and industrial plants as well as transport vehicles.

PV Gas has signed six LNG master sale and purchase agreements with foreign suppliers, it said, without providing any names.

In 2019, PV Gas signed a framework agreement with PV Power to supply LNG to the latter's Nhon Trach 3 and Nhon Trach 4 power plants in Dong Nai province.

PV Gas' announcement came as the Vietnamese government has recently joined some global effort targeting fossil fuels to help mitigate global warming.

On Nov. 2, Vietnam joined the Global Methane Pledge with more than 100 other countries on the occasion of COP26, UN Climate Change Conference, with a collective target of reducing global methane emissions by at least 30% from 2020 levels by 2030.

At COP26, Vietnam also committed to phase out and not build, or invest, in new coal power, and pledged to reach net zero by 2050.

On Nov. 9, Vietnam's Deputy Prime Minister Le Van Thanh ordered the Ministry of Industry and Trade to revise the draft power development plan over 2021-2030, otherwise known as the PDP VIII, to reflect Vietnam's net zero commitment announced at the COP26. The ministry was also asked to review thoroughly some planned power projects, particularly coal power plants. Investors for these projects either have yet to be identified or have requested to discontinue their participation. — *Vietnam Newsdesk*

HYDROGEN

Singapore kicks off multi-pronged energy transition strategy

Singapore's journey from an international oil and refining hub, that has been core to its economy for decades, to a new energy future, has kicked off in earnest.

A slew of announcements at Singapore International Energy Week 2021 included plans to have around 30% of Singapore's electricity supply from low-carbon electricity imports by 2035.

The regulator Energy Market Authority plans to invite proposals for the supply of up to 4 GW of low-carbon electricity imports into the country by 2035, as part of efforts to decarbonize the power sector.

Singapore is working on a long-term plan to decarbonize its electricity supply that combines natural gas, low-carbon electricity imports, renewables, and low-carbon alternatives like hydrogen and technologies like carbon capture, utilization and storage, which can reduce carbon emissions from fossil fuels, EMA said.

By 2028, Singapore will boast the world's largest subsea power interconnector, a 4,200 km undersea cable carrying solar power from Darwin in northern Australia to Singapore, to meet around 15% of the city-state's total power supply.

Low-carbon electricity imports include 100 MW of electricity from Peninsular Malaysia via the existing interconnector expected to commence in early-2022; a pilot project to import 100 MW of non-intermittent electricity from a solar farm in Pulau Bulan, Indonesia, by around 2024; and 100 MW of power from Laos via the Laos-Thailand-Malaysia-Singapore Power Integration Project, among others.

Singapore could also introduce green hydrogen into its energy mix in less than five years.

Sembcorp Industries, with a power generation portfolio of over 12,800 MW across Asia, of which more than 3,300 MW is renewable energy, signed a memorandum of understanding in October with Japan's Chiyoda Corp. and Mitsubishi Corp. to set up a commercial-scale supply chain to deliver decarbonized hydrogen to Singapore, making it one of the first utilities in the city-state to move forward on the new fuel source.

The partnership will utilize Chiyoda's hydrogen storage and transportation technology in which methylcyclohexane or MCH will be the liquid organic hydrogen carrier.

The selection of the MCH route is significant because other green hydrogen exports from places like Qatar have opted for liquid hydrogen, while other exporters in the Middle East are exploring ammonia-based options.

Power generation is the second-largest contributor to Singapore's carbon emissions after the industrial sector, accounting for around 39% of total emissions, according to government data. Nearly 95% of Singapore's power generation comes from natural gas.

Eventually, decarbonizing power will involve diverse solutions ranging from importing renewable electricity to hydrogen. In the interim carbon-neutral LNG will allow importers to select the supplier with the least carbon footprint, which is why Pavilion Energy has asked its gas producers to provide a full statement of their greenhouse gas emissions.

Pavilion Energy, backed by state investment group Temasek Holdings, was the first to import a carbon neutral LNG cargo in April. It plans to build an emissions business that taps carbon offsets initially to drive decarbonization across the LNG value chain, its interim chief executive, Alan Heng said recently.

But he has also warned that renewables are not yet ready to assume a greater and more stable role in the global energy mix. Pavilion's concerns were echoed by Tellurian's Martin Houston at the S&P Global Platts Asia LNG & Hydrogen Conference, who said there was "clearly a conflict between our need to decarbonize and the way we're going about it on a global basis."

"If we demonize this industry much more and if we take away the capital in the industry, we will cut supply, demand will continue to increase and ultimately the lights will go out," he said.

Most conference panelists were realistic about their expectations from carbon-neutral LNG as well, pointing out that its an interim and partial solution until more advanced technologies like CCS are proven, and can only serve as a last resort after all other abatement options have been fully utilized.

Singapore's initiatives will be pulled together under a carbon marketplace.

Singapore's carbon market, expected to launch by the end of 2021, could potentially play a vital role in overhauling the voluntary carbon market, which is fragmented and often criticized for not being robust enough to meet what is a lofty goal—to cap the world's CO2 emissions.

The initiative called Climate Impact X or CIX is backed by state investor Temasek Holdings, one of the world's largest investment portfolios, DBS Bank, the Singapore Exchange and Standard Chartered.

With Singapore ready to import electricity from Australia, conversations around a wider marketplace for trading carbon and Guarantees of Origin are already happening between the countries. Australia's proposed carbon exchange is expected to start by 2023.

Both Singapore and Australia are working towards driving climate initiatives in Southeast Asia and the Pacific region.

COP26 saw Australia doubling it climate funding support for the region to A$2 billion (about $1.5 billion) and pulling in Fiji and Papua New Guinea into its Indo-Pacific Carbon Offsets Scheme, which is modelled on Australia's domestic carbon market called Emissions Reduction Fund, to develop a carbon offset scheme in the Indo-Pacific region.

(This story was first published on Nov. 10 on https://www.spglobal.com/platts/en/market-insights/blogs) — *Eric Yep*

H2 Green to develop hydrogen and ammonia hub in Shoreham, UK, to decarbonize port

- **Potential to fuel 800 trucks per day**
- **20-MW of hydrogen capacity once at scale**
- **Eyes ammonia import facility**

H2 Green is to develop a renewable energy hub at the port of Shoreham on the south coast of the UK, including hydrogen and ammonia production and new onshore wind and solar generation to decarbonize port operations, parent company Getech said in a statement Nov. 15.

The project will initially provide renewable hydrogen and electricity to the port's 39 heavy forklift trucks and 12 heavy trucks, with potential to expand supplies beyond the port.

In a second phase, the project could decarbonize the 800 trucks a day that pass through the port, and could fuel port and coastal marine craft.

H2 Green plans to develop an ammonia import facility in a third phase.

"By bringing together the building blocks of green hydrogen production, renewable power investment, ammonia import, and mobilizing a wide range of stakeholders, H2 Green will provide the most flexible, reliable, and cost-effective green energy solution for the Port, its customers and the wider region," Getech CEO Jonathan Copus said in the statement.

The company expects hydrogen production to expand to around 8 mt/day over a period of five to seven years, with first production expected in late 2023 or early 2024, H2 Green told S&P Global Platts in an email Nov. 15.

Hydrogen will be produced by a 20-MW electrolyzer once at full scale, powered by renewable energy.

The hydrogen production facility will be optimized with new solar and onshore wind facilities.

Production could further expand to over 15 mt/day, once all heavy vehicles in the port are converted to run on hydrogen, H2 Green said.

A final investment decision is expected in the second half of 2022.

H2 Green has a two-year exclusive agreement with the port to develop the hub. The parties will now carry out detailed planning and scheduling for each element of the proposed facility. Shoreham Port Authority has committed to convert all suitable vehicles to run on hydrogen or electricity, Getech said.

H2 Green said the project would remove around 45,000 mt/year of CO2 emissions from the port's fleet of trucks, and could catalyze the decarbonization of the wider region.

The company sees the potential demand for renewable hydrogen, power and by-products such as oxygen and heat from nearby industries, including gas-fired power generation, timber and steel handling, and water treatment projects.

Scalable model

Getech said the model of integrating a decarbonized port and industrial cluster could be scaled and replicated across the country and internationally.

H2 Green plans to develop a network of localized hydrogen supply, storage and distribution hubs in the UK, the first of its kind in the country.

The company has an exclusive option to redevelop redundant gas infrastructure assets owned by SGN Commercial Services in Scotland and southern England for hydrogen distribution around the UK, H2 Green managing director Luke Johnson told Platts in an interview in May.

Getech is a geoscience and geospatial technology company focused on energy transition projects, and bought H2 Green in March.

Calculated costs for green hydrogen production are currently above those for blue hydrogen produced from fossil fuels with carbon capture and storage. But costs are expected to fall dramatically this decade.

Platts assessed the cost of producing hydrogen via alkaline electrolysis in the UK (including capex) at GBP10.99/kg ($14.75/kg) Nov. 12, based on month-ahead power prices. PEM electrolysis production was assessed at GBP13.09/kg, while blue hydrogen production by autothermal reforming was less than half the price GBP4.26/kg (including capex, CCS and carbon). — *James Burgess*

Johnson Matthey, Hystar target 10% efficiency gain in PEM hydrogen technology

- **MOU on catalyst technology for PEM electrolyzers**
- **JM eyes platinum recycling for hydrogen technology**
- **Efficiency gains to drive down green hydrogen costs**

UK specialty chemicals and sustainable technologies company Johnson Matthey is to partner with Norwegian electrolyzer producer Hystar to improve hydrogen production technology, Johnson Matthey said in a statement Nov. 15, reducing costs for producing the renewable gas.

The companies aim to increase the efficiency of Hystar's proton exchange membrane electrolyzer systems by 10%, enabling cost reductions for producing renewable hydrogen.

Under a memorandum of understanding with Hystar, Johnson Matthey will provide catalyst coated membranes (CCMs) for use in Hystar's PEM stack and electrolyzer systems, the company said.

"The Hystar cell design offers significant performance improvements for electrolyzer users and JM's CCMs have a much thinner, lower resistance membrane than those typically used in today's commercial PEM systems," Johnson Matthey Managing Director for green hydrogen Eugene McKenna said in the statement.

"JM CCMs have performed extremely well under Hystar operating conditions," Hystar Chief Technology Officer and co-founder Alejandro Barnett said. "This is a clear game changer when it comes to improving the performance of our electrolyzers even further."

Johnson Matthey said it was "well placed to drive the creation of closed loop recycling systems" in the renewable hydrogen supply chain, being the world's largest secondary refiner of platinum group metals.

Platinum is commonly used as a catalyst in PEM electrolyzers.

Electricity accounts for the majority of renewable hydrogen production costs, followed by electrolyzer capital costs.

The industry expects green hydrogen costs to fall rapidly this decade, driven by cheap renewables and technology gains.

S&P Global Platts assessed the cost of producing renewable hydrogen via alkaline electrolysis in Europe at €10.37/kg ($11.87/kg) Nov. 12 (Netherlands, including capex), based on month-ahead power prices.

PEM electrolysis production was assessed at €12.43/kg, while blue

hydrogen production by steam methane reforming (including carbon, CCS and capex) was €5.04/kg. — *James Burgess*

Switzerland's Axpo plans new green hydrogen plant in Brugg for local transport

- **15-MW electrolyzer powered by run-of-river hydro**
- **Intends to supply hydrogen to local fueling stations**

Swiss energy group Axpo plans to build a new 15-MW renewable hydrogen production facility in Brugg, Switzerland, the company said in a statement Nov. 15.

The company has signed a memorandum of understanding with local partners to deliver hydrogen to fueling stations in the region, it said.

The planned plant will produce around 2,000 mt/year of green hydrogen by electrolysis of water, powered by Axpo's nearby Wildegg-Brugg hydropower plant.

The hydrogen produced could fuel around 300 trucks and buses a year, the company said. The hydrogen will be transported to a Voegtlin-Meyer filling station by pipeline, and also sold to other refueling stations in the region.

The plant is scheduled to be commissioned at the end of 2023, subject to public approval in December 2021, followed building permit approval.

Local energy supplier IBB Energie also plans to use heat from the plant to supply a local heating network for industrial companies.

S&P Global Platts assessed monthly hydrogen pump prices at Eur9.5/kg ($11.01/kg) on Nov. 1 in Germany, the country with the most hydrogen fueling stations in Europe.

Trade association Hydrogen Europe told Platts in October that prices of around Eur5/kg were needed for hydrogen to compete with diesel in trucks, while for passenger cars breakeven prices were around Eur6-7/kg versus gasoline vehicles.

Germany has 91 stations in operation, compared with Switzerland's 9, according to H2 Mobility. — *James Burgess*

SUBSCRIBER NOTES

Platts to launch new daily carbon neutral hydrogen assessments

S&P Global Platts has decided to launch its first suite of carbon-neutral hydrogen assessments, effective Dec. 9, 2021.

Building on its industry-leading price valuations for hydrogen, Platts will launch new carbon-neutral hydrogen (CNH) price assessments by assessing the value of hydrogen as a molecule separated from its production pathway.

Platts will consider Carbon Neutral trading activity in which emissions have been, in order of priority: avoided where possible through the use of low emissions generation, removed through the use of carbon capture and storage, and offset through the use of carbon credits or equivalent instruments.

Power-purchase agreements and hydrogen offtake agreements also may be considered, but normalized for terms, periods and other factors.

In the absence of spot market activity, Platts will consider the marginal carbon neutral production costs incorporating the cost of renewables, carbon capture, guarantees of origin/renewable energy certificates and where appropriate the cost of offsetting carbon emissions generated during production.

Carbon removal costs will be accounted for using Platts CRC removals-based carbon credits, which reflect the most competitive carbon credit assessments for nature-based projects that remove GHG emissions, as well as California Carbon Allowance prices in appropriate markets.

Platts will publish daily assessments in six locations, which have the greatest potential to become hydrogen hubs as global markets emerge: California and the Texas and Louisiana in US Gulf Coast in the Americas, the Netherlands in Northwest Europe, Saudi Arabia in the Middle East, Japan and Western Australia in Asia-Pacific.

Assessments will be measured in $/kg, $/MMBtu, Eur/kg and Eur/MMBtu.

Specifications include: Minimum lot sizes-20,000 kg, 99.99% purity, at 350 Bar pressure, for prompt delivery the month following the trading date, EX Works. Other quantities and purity levels will be normalized to this basis.

The prices will be published on Platts Dimensions Pro and under the Market Data Category: HY.

The following symbols have been created:

EXW Australia Carbon Neutral Hydrogen $/MMBtu HYAUD00
EXW Australia Carbon Neutral Hydrogen $/MMBtu MAvg HYAUD03
EXW Australia Carbon Neutral Hydrogen $/kg HYAUC00
EXW Australia Carbon Neutral Hydrogen $/kg MAvg HYAUC03
EXW California Carbon Neutral Hydrogen $/MMBtu HYCAB00
EXW California Carbon Neutral Hydrogen $/MMBtu MAvg HYCAB03
EXW California Carbon Neutral Hydrogen $/kg HYCAA00
EXW California Carbon Neutral Hydrogen $/kg MAvg HYCAA03
EXW Far East Asia Carbon Neutral Hydrogen $/MMBtu HYFED00
EXW Far East Asia Carbon Neutral Hydrogen $/MMBtu MAvg HYFED03
EXW Far East Asia Carbon Neutral Hydrogen $/kg HYFEC00
EXW Far East Asia Carbon Neutral Hydrogen $/kg MAvg HYFEC03
EXW Middle East Carbon Neutral Hydrogen $/MMBtu HYMEB00
EXW Middle East Carbon Neutral Hydrogen $/MMBtu MAvg HYMEB03
EXW Middle East Carbon Neutral Hydrogen $/kg HYMEA00
EXW Middle East Carbon Neutral Hydrogen $/kg MAvg HYMEA03
EXW North West Europe Carbon Neutral Hydrogen Eur/MMBtu HYNWB00
EXW North West Europe Carbon Neutral Hydrogen Eur/MMBtu MAvg HYNWB03
EXW North West Europe Carbon Neutral Hydrogen Eur/kg HYNWA00
EXW North West Europe Carbon Neutral Hydrogen Eur/kg MAvg HYNWA03
EXW US Gulf Coast Carbon Neutral Hydrogen $/MMBtu HYUSB00
EXW US Gulf Coast Carbon Neutral Hydrogen $/MMBtu MAvg HYUSB03
EXW US Gulf Coast Carbon Neutral Hydrogen $/kg HYUSA00
EXW US Gulf Coast Carbon Neutral Hydrogen $/kg MAvg HYUSA03

Please send all questions and comments to hydrogenassessments@spglobal.com and pricegroup@spglobal.com. For written comments, please provide a clear indication if comments are not intended for publication by Platts for public viewing. Platts will consider all comments received and will make comments not marked as confidential available upon request.

Platts launches Atlantic LNG physical eWindow

S&P Global Platts has launched the Platts Editorial Window, or eWindow, communication tool for its Atlantic LNG physical Market on Close (MOC) assessment process for its DES Northwest Europe (NWE), DES Mediterranean (MED) and FOB Gulf Coast Marker (GCM) price assessments on Sept. 24, 2021.

Participants in the Platts MOC process are now able to submit bids, offers and expressions of interest to trade for publication directly through the eWindow communication tool or through an editor, who would then publish the information using the software.

The instruments that are launched for the Platts Atlantic LNG are from the third to the fifth half-month forward (H+3 to H+5) in dollars per MMBtu for the DES NWE and DES MED assessments, and 30-60 days forward for FOB GCM.

Market participants can state their specific bid or offer delivery windows — for example, 3-day or 5-day delivery or loading windows — within these instruments.

The instruments will allow for a variety of different delivery or loading locations to be used in bids and offers, such as: DES UK, DES Spain, etc.
For delivery locations that are not listed individually, market participants can select "DES in TQC" and input the details directly the DES basis of the bid or offer in the Terms, Quality & Comments (TQC) box.
The instruments will allow for a volume range to be expressed for bids and offers, up to 0.3 TBtu.
If the bid or offer is in a volume range, then the instrument called Platts Atlantic LNG (Qty Range) would be selected. The instruments will also allow for a variety of pricing basis.
Market participants can also input directly other terms related to their bids or offers in the TQC box.
The eWindow instruments will generate a different format for headlines of bids, offers and trades published on Platts LNG Alert and via other Platts services.
For example, a headline that currently appears as:
Atlantic LNG MOC: COMPANY Offers Oct TTF ICE Front Month Average +0.15 $/MMBTU DES Pricing 24-30 September. 2 Day Delivery Window: 11-12 October. Base Discharge Port: Buyer to advise during CN process. No later than 20 days prior to the 2 Day Arrival Period, Buyer can nominate substitute Discharge Port in Mugardos, Rotterdam, Dragon, Isle of Grain, South Hook, Montoir, Dunkirk, Zeebrugge, Bilbao, Huelva, Barcelona, Sagunto, FOS. GHV: 1000 to 1120 Btu/SCF. Contract Quantity 3.65 Tbtu +/-5%. Base ship: will be nominated upon completion of deal. No later than 15 days prior to the 1 Day Arrival Period, Seller may nominate an Alternate LNG Ship subject to SSCS and terminal acceptance. Base Load Port: Freeport. Seller's option to nominate an Alternative Load Port no later than 15 days prior to the 2 day Arrival Period. Laytime 36 hours., will be published as:
Platts Atlantic LNG DES NWE+MED H3-H5, COMPANY offers Oct11-Oct12 100% TTF Full Month Oct $0.15 for 3.65 Pricing 24-30 September. Base Discharge Port: buyer to provide at trade confirmation. No later than 20 days prior to the 2 Day Arrival Period, Buyer can nominate substitute Discharge Port in Mugardos, Rotterdam, Dragon, Isle of Grain, South Hook, Montoir, Dunkirk, Zeebrugge, Bilbao, Huelva, Barcelona, Sagunto, FOS. GHV: 1000 to 1120 Btu/SCF. Base ship: will be nominated upon completion of deal. No later than 15 days prior to the 1 Day Arrival Period, Seller may nominate an Alternate LNG Ship subject to SSCS and terminal acceptance. Base Load Port: Freeport. Seller's option to nominate an Alternative Load Port no later than 15 days prior to the 2 day Arrival Period. Laytime 36 hours.
TIMING: All bids and offers will still have to be submitted by 16.00.00.000 London time. Following any trade, market participants will have 60 seconds to rebid or re-offer. No price changes are allowed from 16:28:00:000 to the close of the MOC process at 16.30.00.999. A rebid or re-offer, following a trade, in last 120 seconds prior to the close of the MOC will trigger a 120-second extension from 16.30.01.000 to 16.32.00.999, in order to adequately test that rebid or re-offer.
INCREMENTABILITY: Bids and offers can be improved by a maximum of $0.05/MMBtu and a minimum of $0.01/MMBtu every 120 seconds. As per Platts editorial guidelines, buyers or sellers can withdraw bids/offers at any time when communicating through eWindow, provided no prior interest to transact has been expressed by any potential counterparty. All bids and offers are firm from the moment they are submitted into eWindow to the moment they are traded, the MOC process closes or the bid/offer is withdrawn from the system by the trader or a Platts editor. Market participants can still send bids and offers directly to an LNG editor for publication via eWindow. In markets where Platts eWindow is in operation, the eWindow clock will be used to determine the correct sequence of events when a bid or offer is amended, withdrawn, or traded by an interested counterparty. Bids or offers submitted by phone, or any other medium, such as instant messaging software, shall be measured at the time the bid, offer or trade indication is actually transmitted through the eWindow system via the editor.
Guidelines for the publication of bids and offers in the MOC process are published in the LNG Timing and Increment Guidelines available here: https://www.spglobal.com/platts/en/our-methodology/methodology-specifications/lng/lng-timing-and-increment-guidelines.
Full information relevant to these assessments can be found in the Global LNG specifications guide available here: https://www.spglobal.com/platts/en/our-methodology/methodology-specifications/lng/liquefied-natural-gas-lng-assessments-and-netbacks-methodology.
Platts expects credit relationships that prevail inside its assessment environment to fully reflect relationships in the markets as a whole. eWindow provides direct entry and management of credit filters which should mirror those normally applied in the marketplaces.
Where Platts editors publish bids and offers on behalf of a company that submits data to an editor, counterparty credit settings are set to "open" for regular participants in the assessment process unless companies have notified Platts in advance of any restrictions.
If a counterparty submitting information through an editor has not already notified Platts of any counterparty credit restrictions, they should notify Platts at least one hour prior to the start of the MOC process if any counterparty credit filters need to be modified.
Please send all feedback, comments and questions to lngeditorialteam@spglobal.com and pricegroup@spglobal.com.
For written comments, please provide a clear indication if comments are not intended for publication by Platts for public viewing.
Platts will consider all comments received and will make comments not marked as confidential available upon request.

Platts proposes to change timing and increment guidelines for Asia LNG MOC

S&P Global Platts is proposing to change the timing and increment guidelines for its Asia LNG Market on Close assessment process.
Platts proposes to allow a maximum price move of 5 cents/MMBtu per 60 seconds for bids and offers submitted through the eWindow communication tool and through a Platts editor for the Asia LNG physical MOC process, and a maximum price move of 5 cents/MMBtu per 30 seconds for bids and offers submitted through the eWindow communication tool and 5 cents/MMBtu per 60 seconds for bids and offers through the Platts editor for the Asia LNG derivatives MOC process from Jan. 17, 2022.
Platts is also proposing to change the final state for the Asia LNG physical MOC process to 16:29:00 Singapore time for eWindow or manual MOC environment, and Asia LNG derivatives to 16:29:30 Singapore time for eWindow MOC environment and 16.29.00 Singapore time for manual MOC environment.
Time allowed for participants to repeat a bid or offer for Asia LNG physical will remain unchanged from the current guideline of maximum 60 seconds following a trade, while the maximum time allowed for participants to repeat a bid or offer for Asia LNG derivatives following a trade will be shortened to 30 seconds, from 60 seconds currently.
An extension of the MOC process will be triggered by a rebid or re-offer following a trade between 16:29:00 and 16:30:00 Singapore time for Asia LNG physical, and between 16:29:30 and 16:30:00 Singapore time for Asia LNG derivatives.
The extension period will last for one minute until 16:31:00 Singapore time for both Asia LNG physical and derivatives in order to adequately test that bid or offer.
The proposed changes will apply to bids and offers submitted by market participants for the Platts JKM, WIM and MEM assessments directly through the Platts Editorial Window, or eWindow, communication tool and through a Platts editor who would then publish bids and offers using the software.
Under Platts existing timing and increment guidelines, bids and offers for Asia LNG physical submitted directly through the eWindow tool and through a Platts editor can improve by up to 5 cents/MMBtu per 120 seconds, with final state at 16:28:00 Singapore time.
Bids and offers for Asia LNG derivatives submitted directly through the eWindow communication tool can improve by a maximum of 5 cents/MMBtu every 60 seconds, and by a maximum of 5 cents/MMBtu every two minutes in the manual MOC process, with final state at 16:29:00 Singapore time.
The increments have been amended to a maximum of 10 cents/MMBtu every 30 seconds for Asia LNG derivatives since Oct. 12, and to a maximum of 5 cents/MMBtu every 60 seconds for Asia LNG physical since Oct. 8 until further notice, to reflect the current volatility in the market due to European gas market price movements (https://www.spglobal.com/platts/en/our-methodology/subscriber-notes/101221-platts-asia-lng-derivatives-market-on-close-incrementability-changes).

Platts has established clearly defined timing guidelines and standards of incrementability that apply when publishing bids and offers in the MOC process, in order to ensure an orderly and transparent price assessment process.
Guidelines for the publication of bids and offers in the MOC process are available in the Platts LNG Timing and Increment Guide, available here: https://www.spglobal.com/platts/en/our-methodology/methodology-specifications/lng/lng-timing-and-increment-guidelines.
Please send all comments, feedback and questions to LNGeditorialteam@spglobal.com and pricegroup@spglobal.com by Dec. 1.
For written comments, please provide a clear indication if comments are not intended for publication by Platts for public viewing.
Platts will consider all comments received and will make comments not marked as confidential available upon request.

Vercer Capital Markets Trading Limited changes entity name to Dare Global Limited

Vercer Capital Markets Trading Limited has advised Platts that it would like to change its participating entity name in the Platts Market on Close assessment processes for:
Americas Fuel Oil - Paper
Asia Naphtha-Paper
Asia Mogas-Paper
Asia Jet Fuel-Paper
Asia Gasoil-Paper
Asia Fuel Oil-Paper
Asia APAC LNG - Paper
EMEA Naphtha-Paper
EMEA Mogas-Paper
EMEA Jet Fuel-Paper
EMEA Gasoil/Diesel- Paper
EMEA Fuel Oil - Paper
EMEA Crude BFOE CFDs- Paper
This follows the Vercer Capital Markets Trading Limited name change to Dare Global Limited.
Platts has reviewed Dare Global Limited and will consider information from Dare Global Limited in the Americas, Asia and EMEA assessment processes for the abovementioned markets, subject at all times to adherence with Platts editorial standards.
Platts will publish all relevant information from Dare Global Limited accordingly.
Platts welcomes all relevant feedback regarding MOC participation. Platts considers bids, offers and transactions by all credible and creditworthy parties in its assessment processes. For comments and feedback, please contact:
Platts editors at oilgroup@spglobal.com and PriceGroup@spglobal.com.

HYDROGEN & CARBON

NORTH AMERICA HYDROGEN ASSESSMENTS, NOVEMBER 12*

	Excluding Capex		Including Capex	
Production Pathway	**$/kg**	**Change**	**$/kg**	**Change**
Alberta (C$/kg)				
SMR w/o CCS	0.7600	+0.0554	1.4883	+0.0619
Alkaline Electrolysis	5.0183	+1.4867	6.2211	+1.4976
PEM Electrolysis	5.7970	+1.7175	7.9519	+1.7368
Appalachia				
SMR w/o CCS	0.6959	+0.0716	1.2912	+0.0716
Alkaline Electrolysis	2.6991	+0.0101	3.5784	+0.0100
PEM Electrolysis	3.1178	+0.0116	4.6934	+0.0117
Gulf Coast				
SMR w/o CCS	0.7343	+0.0018	1.2384	+0.0019
Alkaline Electrolysis	2.0423	-0.1608	2.8747	-0.1608
PEM Electrolysis	2.3592	-0.1857	3.8506	-0.1857
Midcontinent				
SMR w/o CCS	0.6933	+0.0006	1.2246	+0.0006
Alkaline Electrolysis	1.5000	+0.1555	2.3539	+0.1556
PEM Electrolysis	1.7328	+0.1797	3.2626	+0.1797
Northeast				
SMR w/o CCS	0.7569	+0.0944	1.3916	+0.0944
Alkaline Electrolysis	2.2498	-0.1158	3.1544	-0.1158
PEM Electrolysis	2.5988	-0.1339	4.2196	-0.1338
Northern California				
SMR w/o CCS	0.8938	-0.0251	1.6241	-0.0251
Alkaline Electrolysis	2.8669	-0.0990	3.8531	-0.0990
PEM Electrolysis	3.3117	-0.1143	5.0787	-0.1144
Northwest				
SMR w/o CCS	0.6449	-0.0965	1.2275	-0.0965
Alkaline Electrolysis	1.7458	-0.5507	2.6419	-0.5507
PEM Electrolysis	2.0166	-0.6362	3.6222	-0.6362
Rockies				
SMR w/o CCS	0.6987	-0.0204	1.2569	-0.0203
Alkaline Electrolysis	1.7746	-0.8291	2.6412	-0.8291
PEM Electrolysis	2.0500	-0.9577	3.6026	-0.9577
Southeast				
SMR w/o CCS	0.7848	+0.0528	1.3045	+0.0528
Alkaline Electrolysis	2.4296	+0.2985	3.2843	+0.2985
PEM Electrolysis	2.8066	+0.3448	4.3378	+0.3448
Southern California				
SMR w/o CCS	0.7984	-0.1321	1.4992	-0.1321
Alkaline Electrolysis	3.1562	+0.0213	4.1221	+0.0213
PEM Electrolysis	3.6460	+0.0248	5.3766	+0.0247
Upper Midwest				
SMR w/o CCS	0.7361	-0.0057	1.3045	-0.0057
Alkaline Electrolysis	2.5560	-0.2998	3.4623	-0.2998
PEM Electrolysis	2.9525	-0.3464	4.5764	-0.3464

*Assessed previous day

JAPAN HYDROGEN ASSESSMENTS, NOVEMBER 15

	Excluding Capex		Including Capex	
Production Pathway	**Yen/kg**	**Change**	**Yen/kg**	**Change**
SMR w/o CCS	564.2392	+15.2530	650.3481	+15.1321
Alkaline Electrolysis	941.2330	+1.9899	1083.4334	+1.7901
PEM Electrolysis	1087.2811	+2.2986	1342.0621	+1.9407

ASSESSMENT RATIONALE

The S&P Global Platts hydrogen prices are daily valuations that incorporate the cost of variable natural gas, electricity, and carbon inputs, where applicable. A second set of valuations include fixed assumptions for capital and operating expenses. The Platts hydrogen prices are not based on observed or reported market transactions. Details on the Platts hydrogen methodology can be found at: https://www.spglobal.com/platts/en/our-methodology/methodology-specifications/energy-transition/hydrogen-methodology.

VOLUNTARY CARBON CREDITS, NOVEMBER 15

	$/mtCO2e	Change	Eur/mtCO2e	Change
Platts CEC	8.550	+0.200	7.467	+0.174

Note: The Platts CEC assessment reflects the value of CORSIA-eligible credits in the voluntary carbon market, and is not a component of Platts hydrogen assessments.

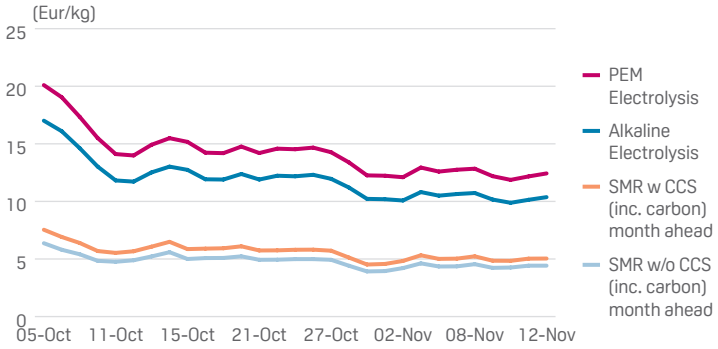
UK HYDROGEN ASSESSMENTS, NOVEMBER 15

Production Pathway	GBP/kg	Change	GBP/KWh	Change
ATR w CCS	4.2484	+0.3112	0.1275	+0.0094
ATR w CCS (inc. Capex & Carbon)	4.5676	+0.3112	0.1370	+0.0093
Alkaline Electrolysis	11.2103	+0.8407	0.3363	+0.0252
Alkaline Electrolysis (inc. Capex)	11.8298	+0.8397	0.3549	+0.0252
PEM Electrolysis	12.9471	+0.9711	0.3885	+0.0292
PEM Electrolysis (inc. Capex)	14.0572	+0.9694	0.4218	+0.0291

NETHERLANDS HYDROGEN ASSESSMENTS, NOVEMBER 15

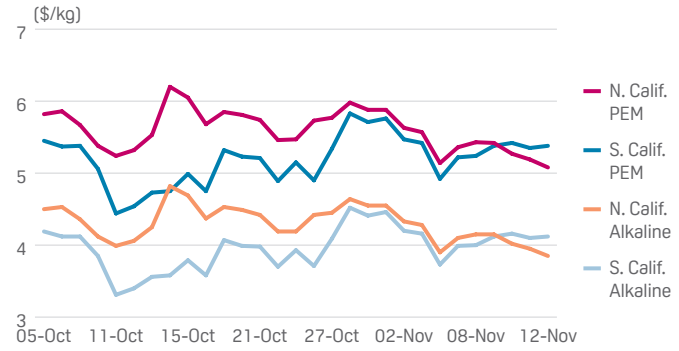
Production Pathway	Eur/kg	Change	Eur/KWh	Change
SMR w/o CCS	3.6808	+0.2690	0.1104	+0.0080
SMR w/o CCS (inc. Capex)	4.1220	+0.2700	0.1237	+0.0081
SMR w/o CCS (inc. Carbon)	4.2713	+0.2958	0.1282	+0.0089
SMR w/o CCS (inc. Capex & Carbon)	4.7125	+0.2967	0.1414	+0.0089
SMR w CCS	4.5949	+0.3238	0.1379	+0.0098
SMR w CCS (inc. Capex)	5.3094	+0.3254	0.1593	+0.0098
SMR w CCS (inc. Carbon)	4.6540	+0.3265	0.1396	+0.0098
SMR w CCS (inc. Capex & Carbon)	5.3684	+0.3280	0.1611	+0.0099
Alkaline Electrolysis	10.1491	+0.5109	0.3045	+0.0153
Alkaline Electrolysis (inc. Capex)	10.8778	+0.5125	0.3264	+0.0154
PEM Electrolysis	11.7211	+0.5901	0.3517	+0.0177
PEM Electrolysis (inc. Capex)	13.0267	+0.5931	0.3908	+0.0178

NETHERLANDS HYDROGEN (INCLUDING CAPEX)



Source: S&P Global Platts

CALIFORNIA ELECTROLYSIS (INCLUDING CAPEX)



Source: S&P Global Platts

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- Hear in-depth discussions of the energy transition and the next steps for Mexico and the US
- Meet with senior officials and entrepreneurs from the leading oil and gas companies working in the region

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