



Daily Rundown

- Gulf Coast's first dedicated bunkering terminal to refuel ships with LNG
- Pilot LNG CEO expects to produce LNG at competitive cost to large LNG terminals
- BC propane output growth likely due to new LNG projects, Montney

MARINE FUEL

LNG Q&A: Pilot LNG Chief Sees Big Opportunities in North American Bunkering

Editor's Note: The following segment is one in a series by NGI's LNG Insight focused on exploring how the global liquefied natural gas (LNG) market works. The conversations in this series will also analyze news and the issues that matter most to the industry in North America and beyond.

Pilot LNG LLC CEO Jonathan Cook co-founded Exceleerate Energy LP in 2003, where he served as COO. He managed the development of the portfolio of floating storage and regasification unit (FSRU) projects and helped expand the fleet. He also served as CEO of LNG shipper Flex LNG Ltd. Pilot, co-founded by Cook in mid-2019, is *developing* the Gulf Coast's first dedicated bunkering terminal to refuel ships with LNG.

NGI: Was Pilot founded solely with the goal of developing the bunker port along the Gulf Coast?

Jonathan Cook



Source: Pilot LNG LLC

Prompt Month Statistics - Previous 5 Trading Days

	18-Aug	19-Aug	20-Aug	21-Aug	24-Aug
Max GOM Netback (\$US/MMBtu)	3.076	2.976	2.742	2.559	2.784
L48 LNG Feedstock Deliveries (dth/d)	4.65	4.73	5.01	5.12	5.07
Futures (\$US/MMBtu)					
Henry Hub	2.556	2.563	2.503	2.573	2.616
JPN/KOR	4.220	4.090	3.925	3.705	3.905
NBP	3.450	3.358	3.351	3.115	3.347
TTF	3.490	3.424	3.378	3.192	3.421
Shipping (\$US/MMBtu)*					
Sabine Pass to Tokyo	1.144	1.114	1.270	1.264	1.270
Sabine Pass to Milford Haven (U.K.)	0.539	0.523	0.609	0.605	0.608
Sabine Pass to Gate (NW Europe)	0.562	0.545	0.637	0.633	0.637
Landed Price Arbitrage (\$US/MMBtu)**					
Sabine to Tokyo	0.136	0.028	-0.224	-0.518	-0.373
Sabine to Gate	-0.011	-0.068	-0.137	-0.400	-0.224
Europe Fundamentals					
Gas in Storage (TWh)***	988.4	991.5	993.6	995.6	1003.5
% Full	89.3%	89.5%	89.7%	89.9%	90.5%
Difference to Last Year (TWh)	27.5	26.6	24.3	22.9	19.2
Gas in LNG Storage (10 ³ m ³)***	5119.97	5094.6	5283.5	5144.6	5152.2
% Full	60.4%	60.1%	62.3%	60.7%	60.8%
Spark Spread (Eur/MWh)	19.20	19.49	19.66	19.82	20.19
Clean Spark Spread (Eur/MWh)	7.48	7.89	8.27	8.47	8.02
Dark Spread (Eur/MWh)	23.09	23.14	23.26	22.30	23.92
Clean Dark Spread (Eur/MWh)	-4.89	-4.55	-3.92	-4.79	-5.09
PVB/TTF Premium (%) (Sept.)	25.5%	26.4%	27.1%	28.2%	26.4%
NW Europe Mean Temp (°F)	68	68	73	65	TBD
% Diff From 30-Yr Normal	5.0%	5.7%	12.9%	2.1%	N/A
Asia Fundamentals					
JKM/KOR Oil Parity Slope	9.3%	9.0%	8.7%	8.4%	8.7%
Brent Oil Price Parity (\$US/MMBtu)	7.82	7.80	7.72	7.63	7.76
JKM/KOR Futures (\$US/MMBtu)	4.22	4.09	3.93	3.71	3.91
Japan Coal Price (\$US/MMBtu)	2.78	2.77	2.76	2.75	2.74
Beijing Mean Temp (°F)	74	74	73	74	78
% Diff From Normal	2.9%	-0.5%	0.5%	-6.6%	2.4%
Seoul Mean Temp (°F)	79	79	79	78	80
% Diff From Normal	2.8%	3.0%	4.0%	2.8%	5.5%
Tokyo Mean Temp (°F)	86	85	86	86	82
% Diff From Normal	8.8%	7.1%	8.5%	9.4%	4.6%
Latin America Fundamentals (\$US/MMBtu) (Sep Prompt Month)					
Mexico					
East (Altamira) DES	2.75	2.66	2.55	2.33	2.60
West (Manzanillo) DES	3.21	3.11	3.03	2.81	3.09
Argentina DES	3.28	3.18	3.14	2.92	3.19
Brazil DES	3.02	2.92	2.85	2.63	2.90
Chile DES	3.31	3.22	3.15	2.93	3.20
Colombia DES	2.81	2.73	2.63	2.40	2.68
Panama DES	2.83	2.75	2.64	2.42	2.70

Current prompt month prices are for Oct, unless otherwise noted.

*Assumes full freight for both laden and ballast legs.

**Excludes regas fees.

***Most recent data available. Typically delayed by two calendar days.

NGI's LNG INSIGHT

Cook: We founded Pilot to be a project development company in the LNG space to create new markets for LNG internationally, which means things like FSRU or bunkering, because LNG as a marine fuel is a new and emerging market. When we formed Pilot, we were looking at the LNG space and the fact that, presently, there's excess supply in the market. We have a couple other projects we're working on that are FSRU-related import projects.

We thought that having an LNG bunkering facility in the Houston/Galveston area made a lot of sense. That doesn't

...cont' pg. 4

U.S. Gulf Coast LNG Netback Prices (12-Month Strip) 24-Aug-2020

Futures Settle (\$US/MMBtu)

Est Shipping Cost from Gulf Coast (\$US/MMBtu)

Gulf Coast Netback (\$US/MMBtu)

Netback Less Henry Hub Futures (\$US/MMBtu)

Spot Month (shipping based on spot market vessel rate)

Month	JPN/KOR	NBP	TTF	JPN/KOR	NBP	TTF	JPN/KOR	NBP	TTF	Max	Chg	HH	Diff (Margin)
Oct-20	\$3.905	\$3.347	\$3.421	\$1.270	\$0.608	\$0.637	\$2.635	\$2.739	\$2.784	\$2.784	\$0.225	\$2.616	\$0.168

Rest of Curve (shipping based on 1-Yr vessel rate, adjusted for seasonality)

Nov-20	\$4.525	\$4.497	\$4.269	\$1.639	\$0.813	\$0.852	\$2.886	\$3.684	\$3.418	\$3.684	\$0.123	\$2.875	\$0.809
Dec-20	\$5.050	\$5.047	\$4.581	\$1.560	\$0.771	\$0.803	\$3.490	\$4.277	\$3.778	\$4.277	\$0.120	\$3.156	\$1.121
Jan-21	\$5.475	\$5.273	\$4.665	\$1.379	\$0.671	\$0.693	\$4.096	\$4.603	\$3.972	\$4.603	\$0.149	\$3.258	\$1.345
Feb-21	\$5.625	\$5.304	\$4.679	\$1.247	\$0.599	\$0.616	\$4.378	\$4.706	\$4.063	\$4.706	\$0.141	\$3.258	\$1.448
Mar-21	\$5.200	\$4.981	\$4.604	\$1.109	\$0.527	\$0.543	\$4.091	\$4.454	\$4.061	\$4.454	\$0.119	\$3.067	\$1.387
Apr-21	\$4.650	\$4.524	\$4.372	\$1.040	\$0.492	\$0.509	\$3.610	\$4.032	\$3.863	\$4.032	\$0.141	\$2.775	\$1.257
May-21	\$4.550	\$4.243	\$4.330	\$1.056	\$0.498	\$0.519	\$3.494	\$3.745	\$3.810	\$3.810	\$0.119	\$2.733	\$1.077
Jun-21	\$4.450	\$3.954	\$4.228	\$1.120	\$0.529	\$0.556	\$3.330	\$3.425	\$3.672	\$3.672	\$0.119	\$2.760	\$0.912
Jul-21	\$4.430	\$4.001	\$4.231	\$1.138	\$0.540	\$0.566	\$3.292	\$3.461	\$3.664	\$3.664	\$0.119	\$2.794	\$0.870
Aug-21	\$4.660	\$4.038	\$4.279	\$1.218	\$0.579	\$0.609	\$3.442	\$3.458	\$3.669	\$3.669	\$0.118	\$2.803	\$0.866
Sep-21	\$4.865	\$4.239	\$4.450	\$1.293	\$0.619	\$0.651	\$3.572	\$3.620	\$3.799	\$3.799	\$0.118	\$2.792	\$1.007
NTM Avg	\$4.782	\$4.454	\$4.342				\$3.526	\$3.850	\$3.713	\$3.930	\$0.134	\$2.907	\$1.022

West of Suez Spot 174K XDF/MEGI Day Rate: \$60,000

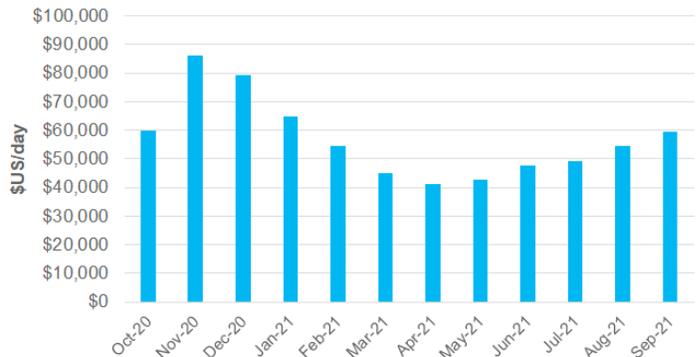
West of Suez 1-Yr TC 174K XDF/MEGI Vessel Rate: \$57,000

Spot Month Sabine Pass Export Landed Price Arbitrage Continuation Chart



Source: NGI calculations, CSI, Fearnleys

West of Suez LNG Vessel Rate Curve



Note: Based on 174,000 m³ XDF/MEGI vessels. This is not an actual traded curve. Figures represent NGI's estimate of a laden leg forward curve based on current spot market and 1-yr charter rates, adjusted for historical seasonality. The simple average of all months equals the 1-yr charter rate.

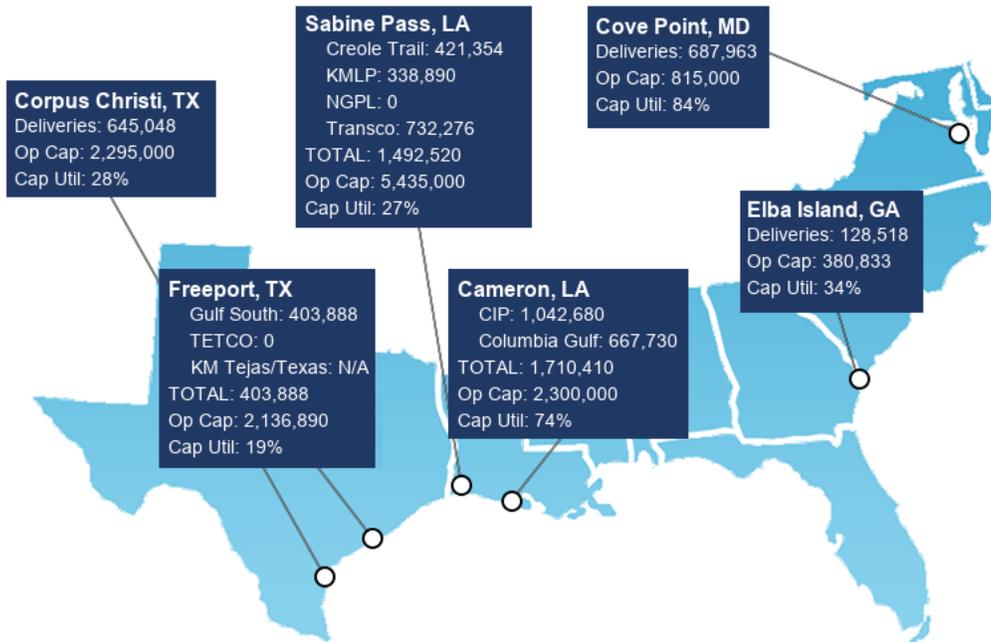
Other North America LNG Netback Prices 24-Aug-2020

	Netback to NGI's AECO				Netback to NGI's SoCal				Netback to NGI's Transco				NGI's Waha
	Western Canada	Forwards	Diff	Diff	Costa Azul	Border Forwards	Diff	Diff	Cove Point	Zn 5 Forwards	Diff	Diff	Forwards
	\$US/MMBtu	\$US/MMBtu	\$US/MMBtu	%	\$US/MMBtu	\$US/MMBtu	\$US/MMBtu	%	\$US/MMBtu	\$US/MMBtu	\$US/MMBtu	%	\$US/MMBtu
Oct-20	\$3.440	\$1.987	\$1.453	73%	\$3.353	\$2.549	\$0.804	32%	\$2.992	\$2.539	\$0.453	18%	\$1.672
Nov-20	\$4.021	\$2.245	\$1.776	79%	\$3.924	\$2.970	\$0.954	32%	\$4.048	\$2.802	\$1.246	44%	\$1.985
Dec-20	\$4.507	\$2.307	\$2.200	95%	\$4.403	\$3.774	\$0.629	17%	\$4.567	\$3.851	\$0.716	19%	\$2.669
Jan-21	\$4.808	\$2.375	\$2.433	102%	\$4.676	\$3.927	\$0.749	19%	\$4.690	\$5.227	-\$0.537	-10%	\$2.982
Feb-21	\$4.912	\$2.383	\$2.529	106%	\$4.770	\$3.715	\$1.055	28%	\$4.685	\$5.039	-\$0.354	-7%	\$2.917
Mar-21	\$4.536	\$2.288	\$2.248	98%	\$4.405	\$2.970	\$1.435	48%	\$4.401	\$3.360	\$1.041	31%	\$2.690
Apr-21	\$4.082	\$2.032	\$2.050	101%	\$3.972	\$2.477	\$1.495	60%	\$4.023	\$2.939	\$1.084	37%	\$2.339
May-21	\$4.045	\$1.982	\$2.063	104%	\$3.949	\$2.459	\$1.490	61%	\$3.857	\$2.756	\$1.101	40%	\$2.296
Jun-21	\$4.004	\$1.968	\$2.036	103%	\$3.921	\$2.623	\$1.298	49%	\$3.809	\$2.805	\$1.004	36%	\$2.333
Jul-21	\$4.008	\$1.994	\$2.014	101%	\$3.930	\$3.138	\$0.792	25%	\$3.834	\$2.588	\$1.246	48%	\$2.513
Aug-21	\$4.226	\$2.012	\$2.214	110%	\$4.146	\$3.266	\$0.880	27%	\$3.873	\$2.656	\$1.217	46%	\$2.549
Sep-21	\$4.398	\$2.002	\$2.396	120%	\$4.310	\$3.004	\$1.306	43%	\$4.015	\$2.732	\$1.283	47%	\$2.409
NTM Avg	\$4.249	\$2.131	\$2.118	99%	\$4.147	\$3.073	\$1.074	35%	\$4.066	\$3.275	\$0.792	24%	\$2.446

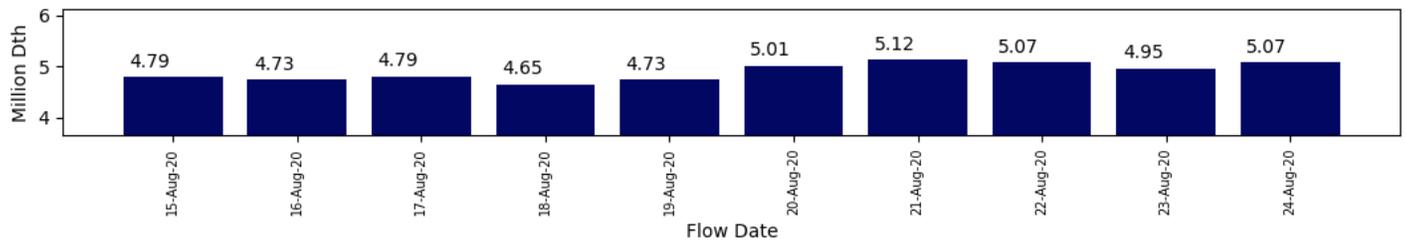
Note: Netbacks are based on deliveries to Asia & Europe. LNG Canada and Costa Azul liquefaction facilities are not expected to be in-service until 2025 and 2023, respectively. But the above calculations give an indication of how LNG may be priced on an FOB basis if those locations were operational. NGI's Forward Look has 10-year forward curves for more than 60 locations in North America. For more information, please visit our Forward Look product page at natgasintel.com/product/forward-look

Source: NGI's Forward Look, CSI, Fearnleys, NGI calculations

NGI's LNG INSIGHT U.S. LNG EXPORT TRACKER 24-Aug-2020



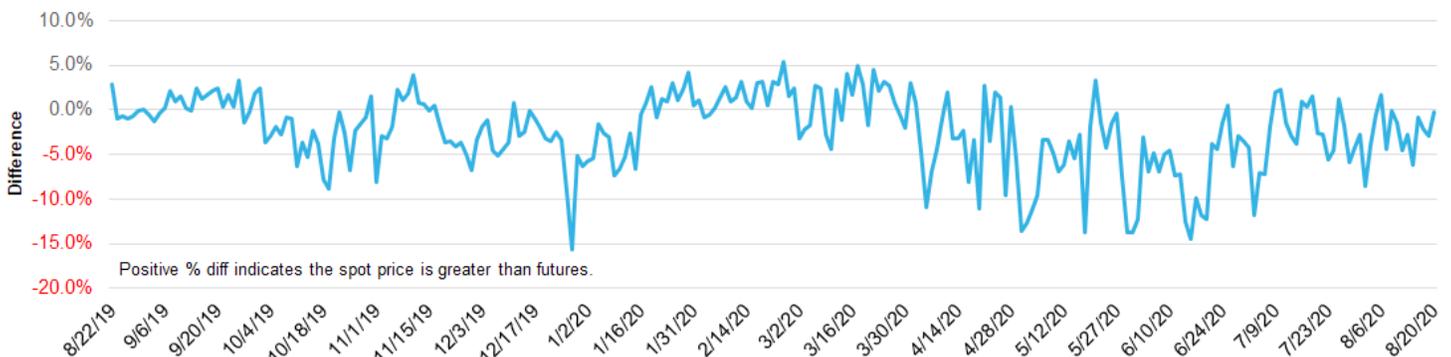
Daily Summary (Volumes Listed in Dekatherms)	
Total Deliveries to U.S. LNG Export Facilities:	5,068,347
Previous Day:	4,950,892
Change:	117,455



Note: Figures are NGI's estimates of gas delivered to each respective LNG liquefaction facility, listed in dekatherms, and based on best available cycle as of the morning of each listed gas day.

Source: Pipeline EBBs, NGI calculations

NGI's Daily Henry Hub Spot Index vs. Prompt (CME) Futures Contract 24-Aug-2020



Interested in the data behind this chart? NGI publishes daily and monthly spot market prices for Henry Hub and more than 140 other locations in North America. Please go to natgasintel.com/product/daily-gpi for more details.

Source: NGI's Daily Gas Price Index, CSI, NGI calculations





LNG Freight Costs for Selected Routes

24-Aug-2020

Trade Route (\$ / MMBtu)	174k MEGI			160k TFDE			145k ST		
Bonny / Montoir	0.597	0.000	↔	0.652	0.000	↔	0.730	0.000	↔
Bonny / Tokyo	1.192	0.000	↔	1.242	0.000	↔	1.328	0.000	↔
Ras Laffan / Montoir	0.729	0.000	↔	0.795	-0.001	▼	0.852	-0.001	▼
Ras Laffan / Tokyo	0.579	0.000	↔	0.641	-0.001	▼	0.704	-0.001	▼
Dampier / Tokyo	0.375	0.000	↔	0.417	-0.001	▼	0.476	-0.001	▼
Zeebrugge / Bahia Blanca	0.650	0.000	↔	0.700	0.000	↔	0.765	0.000	↔
Zeebrugge / Dahej	0.759	0.000	↔	0.788	0.000	↔	0.883	0.000	↔
Zeebrugge / Tokyo	1.193	0.000	↔	1.265	0.000	↔	1.322	0.000	↔
Sabine / Bahia Blanca	0.682	0.000	↔	0.777	0.000	↔	0.870	0.000	↔
Sabine / Dahej	1.094	0.000	↔	1.205	0.000	↔	1.277	0.000	↔
Sabine / Tokyo	1.077	0.000	↔	1.183	0.000	↔	1.265	0.000	↔
Sabine / Zeebrugge	0.525	0.000	↔	0.604	0.000	↔	0.685	0.000	↔
Port Moresby / Tokyo	0.382	0.000	↔	0.435	0.000	↔	0.501	0.000	↔

Source: Fearnleys (www.fearnleys.com). Assumes cold vessel. Speed used is 17 knots on laden passage and 16 knots on ballast passage.



Spot LNG Vessel Rates (\$USD/day)

24-Aug-2020

Vessel Rates		
Vessel Type / Region	WEST	EAST
174k XDF / MEGI	60,000	48,000
155k - 165k TFDE	48,000	40,000
138k - 145k ST	32,000	29,000

Pacific Voyage Parameters

Fuel only on Positioning fee from Hub to Load Port. Fuel and 100% Hire on Ballast Bonus to Singapore

Middle East Voyage Parameters

Fuel only on Positioning fee from Hub to Load Port. Fuel and 100% Hire on Ballast Bonus to Load Port

Atlantic Voyage Parameters

Fuel only on Positioning fee from Hub to Load Port (LP). Fuel & 75% Hire on BB to LP. Fuel & 50% Hire to LP for intra Atlantic basin.

Source: Fearnleys (www.fearnleys.com)

West of Suez LNG Vessel Rate Curve 24-Aug-2020

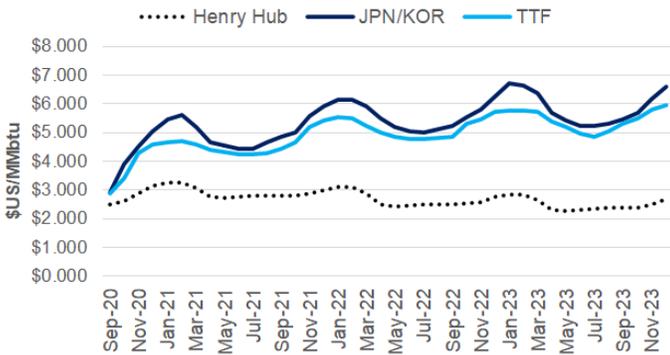
Month	24-Aug	21-Aug	Chg
Oct-20	60,000	60,000	0
Nov-20	86,153	86,153	0
Dec-20	79,083	79,083	0
Jan-21	64,623	64,623	0
Feb-21	54,480	54,480	0
Mar-21	45,107	45,107	0
Apr-21	41,195	41,195	0
May-21	42,656	42,656	0
Jun-21	47,622	47,622	0
Jul-21	48,987	48,987	0
Aug-21	54,493	54,493	0
Sep-21	59,603	59,603	0
Average	57,000	57,000	0

Note: Based on 174,000 m³XDF/MEGI vessels. This is not an actual traded curve. Figures represent NGI's estimate of a laden leg forward curve based on current spot market and 1-yr charter rates, adjusted for historical seasonality. The simple average of all months equals the 1-yr charter rate.



Source: NGI estimates based on Fearnleys data

Global Futures Settles Through 2023 24-Aug-2020



Contract	Date	12-Month Strip*	CY2021	CY2022	CY2023
Henry Hub	24-Aug-20	\$2.884	\$2.909	\$2.649	\$2.495
	21-Aug-20	\$2.881	\$2.916	\$2.649	\$2.493
	Chg	\$0.003	(\$0.008)	\$0.000	\$0.003
JPN/KOR	24-Aug-20	\$4.618	\$5.034	\$5.575	\$5.875
	21-Aug-20	\$4.498	\$4.935	\$5.513	\$5.775
	Chg	\$0.120	\$0.099	\$0.062	\$0.100
TTF	24-Aug-20	\$4.217	\$4.597	\$5.149	\$5.443
	21-Aug-20	\$4.069	\$4.473	\$5.038	\$5.333
	Chg	\$0.148	\$0.124	\$0.111	\$0.110

*Sep 2020 through Aug 2021

Source: Bloomberg, CSI, NGI calculations



Global LNG & NatGas Futures Prices (Sep 2020) 24-Aug-2020

Contract	Cur/Unit	Settle	Chg	% Chg	Settle (\$US/MMBtu)
JPN/KOR	\$US/MMBtu	\$2.898	\$0.000	0.0%	\$2.898
NBP	pence/therm	23.22p	2.17p	10.3%	\$3.033
TTF	Eur/MWh	€ 8.361	€ 0.739	9.7%	\$2.891
Henry Hub	\$US/MMBtu	\$2.513	\$0.065	2.7%	\$2.513

NBP & TTF converted to \$US/MMBtu using same month forex futures contracts.

Source: NGI calculations, CSI



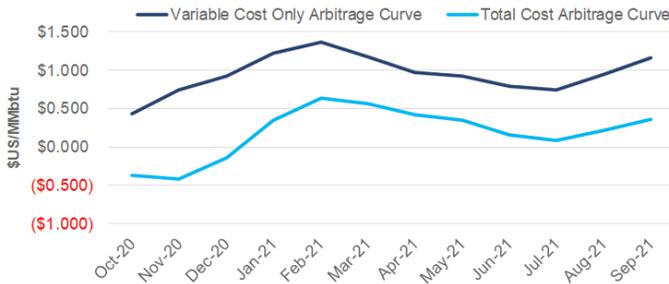
... from MARINE FUEL - Pilot LNG Chief Sees Big Opportunities, pg. 1

necessarily alleviate the problem of excess supply because we're not going to be taking any; we're going to be making our own.

As we looked at it, we thought we could produce the LNG at a cost that's competitive with what the large export terminals are doing. One of the first things we asked ourselves is why wouldn't we just get the LNG from one of the export terminals, bring it to the market and the vessels? But if we can produce LNG at similar costs, we can eliminate the additional

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Estimated Sabine Pass / Asia 12-Month Forward LNG Arbitrage Curves 24-Aug-2020



Note: Assumes title changes hands at sea, so no regas fees. Negative GOM/Asia spreads may not increase the risk of GOM LNG shut-ins as much as those between GOM and Europe, since Europe has much more storage capacity than Asia. As such, Europe often serves as the market of "last resort." Variable costs assume vessels have been chartered, and include fuel, boiloff, Panama Canal and port fees only. Total costs include variable expenses and fixed vessel chartering fees.

Month	115% HH Futures	Shipping Costs Variable	Shipping Costs Fixed	Variable Only Landed Cost	Total Landed Cost	JPN/KOR Futures	Variable Arbitrage Spread	Total Arbitrage Spread
Oct-20	\$3.008	\$0.465	\$0.804	\$3.474	\$4.278	\$3.905	\$0.431	(\$0.373)
Nov-20	\$3.306	\$0.484	\$1.155	\$3.790	\$4.945	\$4.525	\$0.735	(\$0.420)
Dec-20	\$3.629	\$0.500	\$1.060	\$4.129	\$5.189	\$5.050	\$0.921	(\$0.139)
Jan-21	\$3.747	\$0.513	\$0.866	\$4.259	\$5.126	\$5.475	\$1.216	\$0.349
Feb-21	\$3.747	\$0.517	\$0.730	\$4.264	\$4.994	\$5.625	\$1.361	\$0.631
Mar-21	\$3.527	\$0.504	\$0.605	\$4.031	\$4.636	\$5.200	\$1.169	\$0.564
Apr-21	\$3.191	\$0.488	\$0.552	\$3.679	\$4.231	\$4.650	\$0.971	\$0.419
May-21	\$3.143	\$0.485	\$0.572	\$3.628	\$4.199	\$4.550	\$0.922	\$0.351
Jun-21	\$3.174	\$0.482	\$0.638	\$3.656	\$4.294	\$4.450	\$0.794	\$0.156
Jul-21	\$3.213	\$0.481	\$0.657	\$3.694	\$4.351	\$4.430	\$0.736	\$0.079
Aug-21	\$3.223	\$0.488	\$0.730	\$3.711	\$4.442	\$4.660	\$0.949	\$0.218
Sep-21	\$3.211	\$0.494	\$0.799	\$3.705	\$4.504	\$4.865	\$1.160	\$0.361

Source: NGI calculations, CSI, Fearnleys

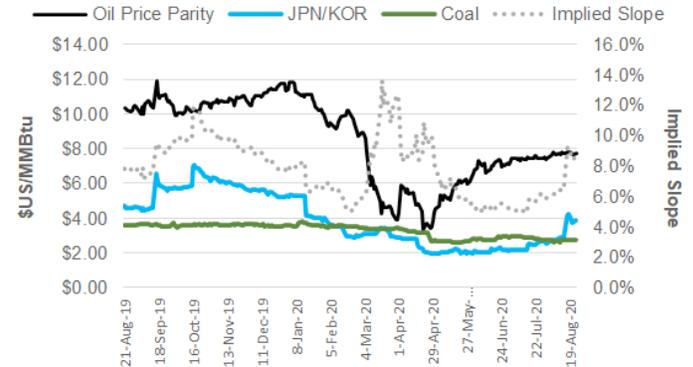


Daily Prompt Oil Linked Asia Parity Prices 24-Aug-2020

Current Spot Month Japan/Korea Futures Contract Price (Oct): **\$3.905**
 Current Spot Month Brent Crude Oil Futures Price (Oct): **\$45.13**
 Current Spot Month Japan Coal Price (Aug): **\$2.74**
 Implied Current Japan/Korea Slope to Brent: **8.7%**

Crude Mo.	3 Mo Avg JCC	Brent	3 Mo Avg JCC	Brent
Oct-20	\$43.11	\$45.13	\$7.42	\$7.76

Trailing 12M Daily Prompt Japan/Korea Futures



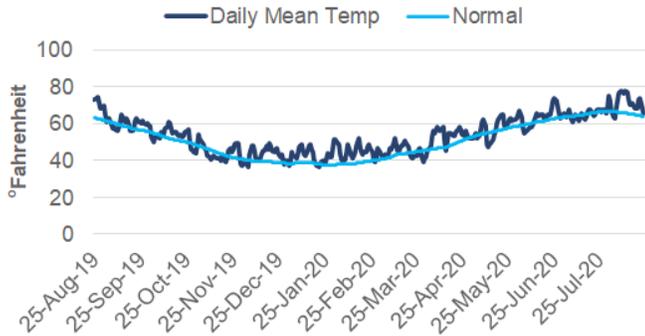
Note: Oil linked parity figures tend to serve as a cap on Asian LNG market prices, while coal prices can help act as a floor.

Source: NGI calculations, ICE, CSI, METI

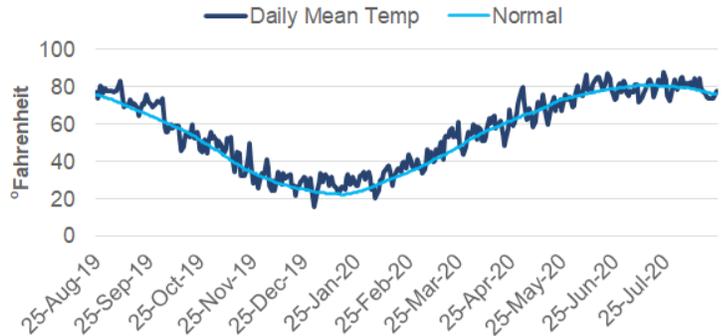


Europe & Asia Weather Data 24-Aug-2020

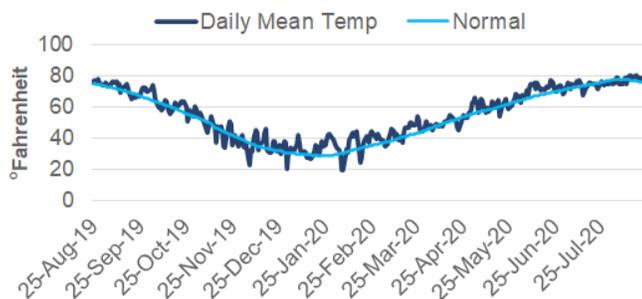
Trailing 365 Day Mean Temperatures - Northwest Europe



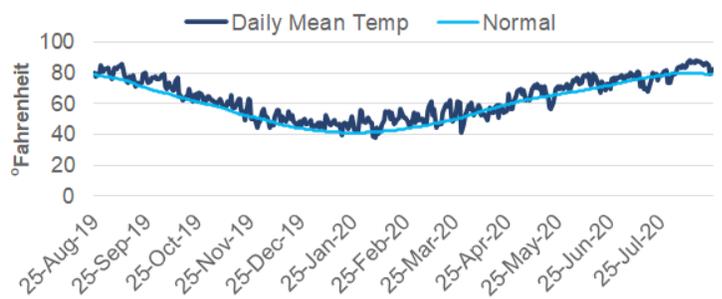
Trailing 365 Day Mean Temperatures - Beijing



Trailing 365 Day Mean Temperatures - Seoul



Trailing 365 Day Mean Temperatures - Tokyo



Source: NGI calculations, Bloomberg



**U.S. Landed vs. European Prices Oct 2020
24-Aug-2020**

Estimated U.S. LNG Landed Price (\$US/MMBtu)

Source	Pricing Point	HH Price	Gate Landed Price (GLP)
GOM	Henry Hub	\$2.616	\$3.186

European NatGas Futures Prices (Eur/MWh & Pound/therm)

Country	Pricing Point	Local Price MWh or therm	Local Price \$US/MMBtu	Diff to GLP* \$US/MMBtu
Belgium	ZTP	€ 8.47	\$2.931	-\$0.255
Czech Rep	CZ VTP	€ 10.18	\$3.522	\$0.336
France	PEG	€ 9.88	\$3.417	\$0.231
Germany	NCG	€ 10.05	\$3.476	\$0.291
Italy	PSV	€ 11.14	\$3.856	\$0.670
Netherlands	TTF	€ 9.89	\$3.421	\$0.236
Slovakia	CEGH VTP	€ 10.45	\$3.616	\$0.430
Spain	PVB	€ 11.17	\$3.865	\$0.679
UK	NBP	25.62p	\$3.347	\$0.161

Euro Exchange Rate: **1.1807**
 Pound Exchange Rate: **1.3063**



Note: U.S. landed price is to the Gate Terminal in the Netherlands, and exclude any regas or European pipeline grid access fees. We estimate the variable portion of such charges range between \$0.10-\$0.50 per MMBtu. All local European prices are Eur/MWh, except UK, which is pence/therm.

**Negative numbers indicate imported U.S. LNG is more expensive than the local price.

Source: NGI calculations, CME, ICE, EEX, Powernext, CSI, Fearnleys

transportation to bring the LNG from the remote locations to the market...The other reason we didn't do that is because most of the export projects are not geared for loading LNG bunker vessels. They're focused on their long-term, large-scale export customers.

NGI: There's been a lot of growth in this space around the world, but why have no dedicated bunkering facilities been constructed along the Gulf Coast?

Cook: I think it's the early stage of this market. Up until the last year or so, except for cruise ships, there ...cont' pg. 7

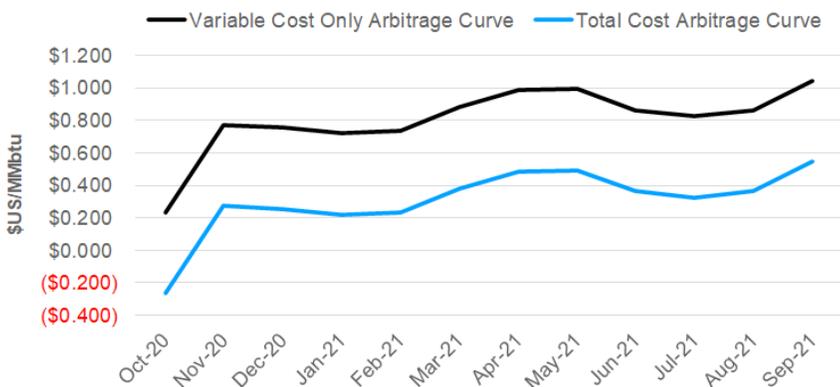
Spanish PVB vs. Dutch TTF Futures 24-Aug-2020

Period	PVB \$US/MMBtu	Chg	TTF \$US/MMBtu	Chg	PVB/TTF Premium (\$)	PVB/TTF Premium (%)
Sep-20	\$3.653	\$0.276	\$2.891	\$0.256	\$0.762	26.4%
Oct-20	\$3.865	\$0.226	\$3.421	\$0.229	\$0.444	13.0%
Nov-20	\$4.471	\$0.147	\$4.269	\$0.133	\$0.202	4.7%
4Q20	\$4.298	\$0.173	\$4.090	\$0.167	\$0.208	5.1%
1Q21	\$4.987	\$0.116	\$4.649	\$0.139	\$0.338	7.3%
2Q21	\$4.640	\$0.127	\$4.310	\$0.121	\$0.330	7.7%

Source: NGI calculations, CSI



Estimated Sabine Pass / Europe (Gate) 12-Month Forward LNG Arbitrage Curves 24-Aug-2020



Note: Negative spreads increase the odds of U.S. Gulf of Mexico sourced LNG cargoes being shut-in. Variable costs assume vessels have been chartered, and include fuel, boil-off, and port fees only. Total costs include both variable expenses and fixed vessel chartering fees. Both exclude regas fees, which we estimate would add another \$0.10-\$0.50 in additional costs to each arbitrage curve calculation.



Month	115% Henry Hub Futures	Shipping Costs Variable	Shipping Costs Fixed	Variable Only Landed Cost	Total Landed Cost	TTF Futures	Variable Arbitrage Spread	Total Arbitrage Spread
Oct-20	\$3.008	\$0.177	\$0.460	\$3.186	\$3.686	\$3.421	\$0.236	(\$0.264)
Nov-20	\$3.306	\$0.191	\$0.660	\$3.498	\$3.998	\$4.269	\$0.772	\$0.272
Dec-20	\$3.629	\$0.196	\$0.606	\$3.826	\$4.326	\$4.581	\$0.755	\$0.255
Jan-21	\$3.747	\$0.198	\$0.495	\$3.945	\$4.445	\$4.665	\$0.720	\$0.220
Feb-21	\$3.747	\$0.198	\$0.418	\$3.945	\$4.445	\$4.679	\$0.734	\$0.234
Mar-21	\$3.527	\$0.197	\$0.346	\$3.724	\$4.224	\$4.604	\$0.880	\$0.380
Apr-21	\$3.191	\$0.193	\$0.316	\$3.384	\$3.884	\$4.372	\$0.988	\$0.488
May-21	\$3.143	\$0.192	\$0.327	\$3.335	\$3.835	\$4.330	\$0.994	\$0.494
Jun-21	\$3.174	\$0.191	\$0.365	\$3.365	\$3.865	\$4.228	\$0.863	\$0.363
Jul-21	\$3.213	\$0.191	\$0.375	\$3.404	\$3.904	\$4.231	\$0.827	\$0.327
Aug-21	\$3.223	\$0.192	\$0.418	\$3.415	\$3.915	\$4.279	\$0.864	\$0.364
Sep-21	\$3.211	\$0.195	\$0.457	\$3.405	\$3.905	\$4.450	\$1.045	\$0.545

Source: NGI calculations, CSI, Fearnleys

European Spark/Dark Spreads (Oct 2020) 24-Aug-2020

EUA Carbon Price (Eur/mt): **27.67**

Nation	Eur/MWh	Spark Spread		Clean Spark Spread	
		EFFCY 49%	45%	49%	45%
Power Futures					
Gas Futures					
BE	41.63	8.470	24.39	22.81	13.13
CZ	39.39	10.179	18.67	16.77	7.41
FR	42.65	9.875	22.55	20.71	11.29
DE	36.57	10.047	16.12	14.24	4.86
IT	45.00	11.144	22.32	20.24	11.06
NL	35.85	9.888	15.72	13.88	4.46
SK	39.88	10.450	18.61	16.66	7.35
ES	41.40	11.170	18.66	16.58	7.40
UK*	44.32	9.672	24.64	22.83	5.27
Average			20.19	18.30	8.02

Nation	Eur/MWh	Dark Spread		Clean Dark Spread	
		EFFCY 35%	35%	35%	35%
Power Futures					
Coal Futures					
BE	41.63	48.65	24.81		-2.06
CZ	39.39	48.65	22.57		-4.30
FR	42.65	48.65	25.83		-1.04
DE	36.57	48.65	19.75		-7.12
IT	45.00	48.65	28.18		1.31
NL	35.85	48.65	19.03		-7.84
SK	39.88	48.65	23.06		-3.81
ES	41.40	48.65	24.58		-2.29
UK*	44.32	48.65	27.50		-18.70
Average			23.92		-5.09

Belgium (BE) / Czech Rep (CZ) / France (FR) / Germany (DE) / Italy (IT) / Holland (NL) / Slovakia (SK) / Spain (ES) / United Kingdom (UK)

*UK clean spark and dark spreads incorporate the cost of the UK Carbon Price Support levy. See methodology for all assumptions.

Source: NGI calculations, CSI



hasn't been much additional interest in ordering LNG-capable vessels. But we've seen more lately, where Royal Dutch Shell plc is chartering LNG-capable tankers like very large crude carriers. The container ships and car carriers are also starting to use LNG too.

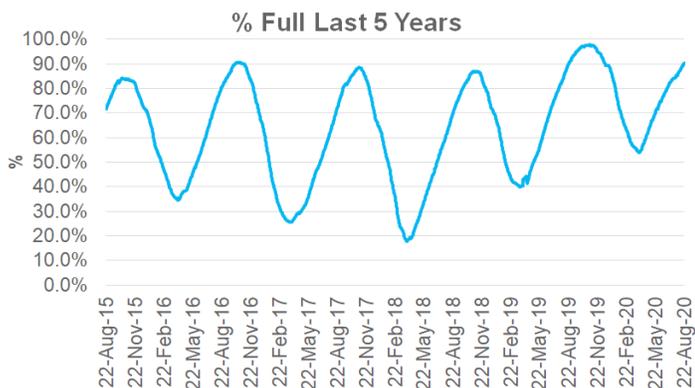
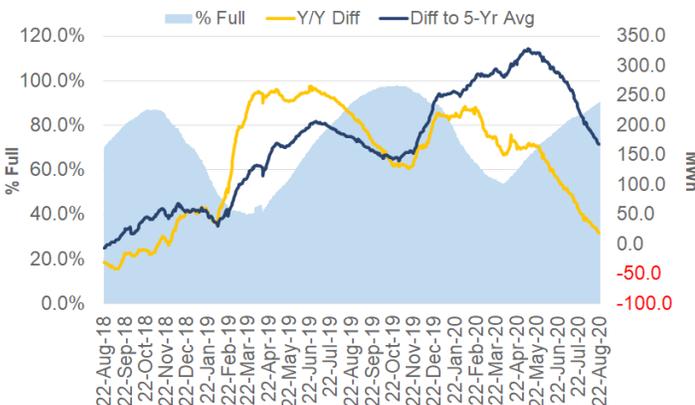
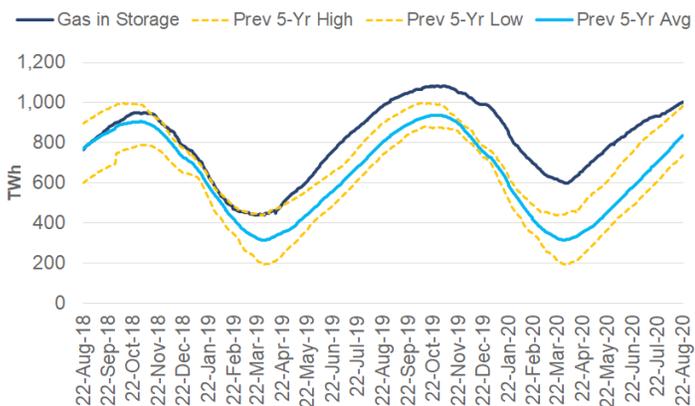
If we compare our project with the projects on the East Coast, like in Jacksonville, FL, those are land-based terminals. Given our background in floating solutions, we saw an opportunity others may have overlooked. From a

...cont' pg. 8

European Union Gas Storage

Data as of 22-Aug-20 Chart Last Updated 24-Aug-20

Volumes in TWh	Gas in Storage	Working Gas	Gas in Storage	Prev	5-Yr		
	22-Aug-20	Volume	% Full	22-Aug-19	Y/Y Diff	5-Yr Avg	Avg Diff
Europe	1003.47	1108.83	90.5%	984.30	19.17	835.46	168.02



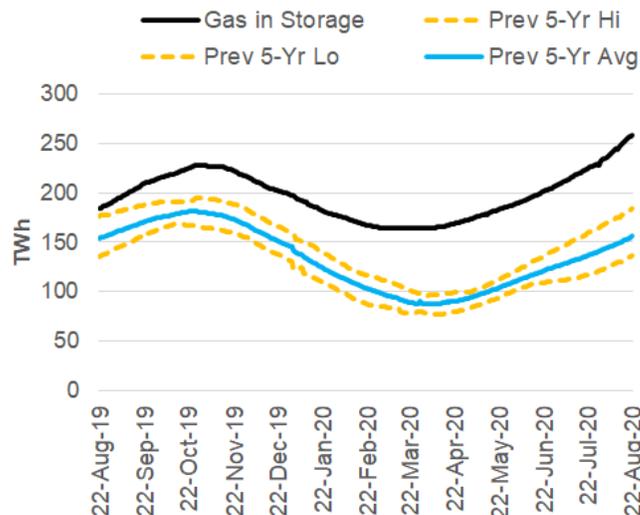
% Full As of	22-Aug-15	22-Aug-16	22-Aug-17	22-Aug-18	22-Aug-19	22-Aug-20
	71.6%	80.7%	72.3%	70.1%	90.1%	90.5%

Source: NGI calculations, GIE

Ukraine Gas Storage

Data as of 22-Aug-20 Chart Last Updated: 24-Aug-20

	Volumes in TWh			Prev	5-Yr	
22/8/20	WG Vol	% Full	22/8/19	Y/Y Diff	5-Yr Avg	Avg Diff
258.87	322.85	80.2%	183.79	75.07	155.71	103.16



Source: NGI calculations, GIE

European Union LNG Regas Terminal Storage

Data as of 22-Aug-20 Chart Last Updated: 24-Aug-20

Country	Terminal	Inventory (10 ³ m ³)	Max Cap		% Util
			Chg	(10 ³ m ³)	
Belgium	Zeebrugge	293.3	-13.1	563.0	52.1%
France	Dunkerque	175.8	-39.0	586.1	30.0%
	Fos Tonkin	51.1	-26.4	80.0	63.8%
	Montoir	187.0	1.7	360.0	51.9%
	Fas Cavaou	130.5	-34.3	330.0	39.5%
Greece	Revythoussa	178.6	-19.5	225.0	79.4%
Italy	Porto Levante	78.4	-33.7	250.0	31.4%
	Panigaglia	19.3	-19.4	40.0	48.2%
	Toscana	180.2	0.0	137.2	131.4%
Lithuania	Klaipėdos	0.0	-57.9	167.1	0.0%
Netherlands	Gate	494.0	-19.1	540.0	91.5%
Poland	Swinoujście	174.0	102.0	320.0	54.4%
Portugal	Sines	276.2	117.7	390.0	70.8%
Spain	Barcelona	470.1	0.0	758.0	62.0%
	Bilbao	294.9	0.0	448.8	65.7%
	Cartagena	377.6	0.0	585.5	64.5%
	Huelva	360.9	0.0	617.9	58.4%
	Mugaros	117.4	0.0	300.0	39.1%
	Sagunto	0.0	0.0	0.0	0.0%
	TVB (Virtual)	0.0	0.0	0.0	0.0%
UK	Grain	707.6	-14.1	1026.4	68.9%
	South Hook	585.4	62.8	751.7	77.9%
Total		5152.2	7.6	8476.6	60.8%

Source: NGI calculations, GIE

construction and cost perspective, smaller land-based terminals would be more expensive. Along the Gulf, from a technical perspective, the land is soft and it would require a lot of pilings to support the equipment for a land-based facility. So, whether it's a cost issue or just the market development issue, those are the only reasons I can think of as to why someone hasn't done this already.

NGI: Can you describe the project and provide an overview of the vessel? How will it receive natural gas and any other equipment that might be required?

Cook: The location we've selected is owned by the Port of Galveston, and it's a relatively remote location on Pelican Island. Most of Pelican Island is a dredge disposal site, and as such, it's not a very attractive site for other types of port activities. An advantage for us is that it's located in the middle of the largest port complex in the United States -- being at the center of the ports of Houston, Texas City and Galveston.

The configuration of the terminal will have a small footprint when it comes to the shore side infrastructure. There will be a control station and a metering station on land, where the gas supply comes in. There will also be a jetty and trestle where the FLNG will be permanently moored. That unit will receive the feed gas and liquefy it. The unit will have 18,000 cubic meters of storage and the capacity to produce 500,000 tons of LNG per year.

LNG bunker barges will load from the terminal and then distribute the LNG to the ships requiring fuel. The ships that are going to be burning the LNG as fuel will not berth alongside our terminal.

NGI: Would Pilot own the bunker barges?

Cook: That's to be determined, and it will depend on the interest from companies that may want to do that kind of distribution, whether it's an existing barge operator or if there's a preference from our customers as to how they want to see that configured. We could establish an affiliate of the project to run those vessels, but that has not yet been finalized.

NGI: Will Pilot construct a pipeline to feed the FLNG unit?

Cook: Energy Transfer LP's Houston Pipe Line Co. LP already has a pipeline that comes onto Pelican Island, and it could be expanded to supply the gas to the terminal. We will contract for the pipeline capacity. This gas will also be coming from intrastate pipeline systems and not interstate systems, and the fact that it is also a bunker project and not an export project, means that we do not have to go through a full permitting process with the Federal Energy Regulatory Commission.

NGI: Can you explain how a ship would get fuel from your facility? For example, do these vessels have to be customers with contracted fueling capacity?

Cook: We'll have a combination of customers with term contracts to be supplied a certain amount of LNG over a dedicated period of time. And then the bunker vessels will be there to supply them. There will also be some volume that is done more on a spot basis, and we'll be working with some of the large international bunker suppliers who have the contracts with the various ship owners that need to procure fuel.

NGI: Do you need long-term contracted customers to reach a final investment decision (FID) on the facility?

Cook: Probably, but that may depend on what our investor

appetite is at FID. We haven't made any firm agreements with anyone on that post-FID funding. It will depend on the appetite of the investors, whether they prefer more long-term contracts or a merchant model, or we could have a contract with one of the majors, like Shell or Total SE. They're both market makers in this space. If they wanted to come in and contract for a portion of our production, we'd be happy to do that.

NGI: How is LNG priced for bunkering?

Cook: It's still early in the process for us, but we're open to different structures. We could supply LNG on a **free-on-board** basis under some sort of tolling arrangement. If it's **ex-terminal**, we could charge for cost of service and delivery, along with the commodity of Henry Hub or whatever the gas benchmark will be.

Most of the contracts we know of in Europe are based on the Dutch Title Transfer Facility price plus the cost for shipping, handling and delivery. Under the LNG bunkers that are provided in Europe, the LNG first needs to be imported, so there's a shipping component to the supply source, then it's discharged into a receiving terminal and loaded onto a bunker vessel. So, you have that cost of the terminal in Europe, where the cargo is basically being double handled. For us, by producing LNG at the market, we avoid those additional costs.

NGI: Would vessels headed from Europe toward the Gulf Coast not need to fill up for a round-trip if your facility is constructed?

Cook: Depending on pricing, they wouldn't have to. By creating LNG bunker supply here in the U.S. Gulf

...cont' pg. 9

2020 EDITION

NGI'S MAP OF NORTH AMERICAN NATURAL GAS PIPELINES, LNG FACILITIES & SHALE PLAYS

- 48 PROPOSED PIPELINES
- 177 OPERATIONAL PIPELINES
- 163 NORTH AMERICAN MARKET HUBS
- 53 LNG IMP/EXP TERMINALS
- PERMIAN ZOOMED PIPELINE INSET
- LA & TX LNG DETAILS
- 47 IMP/EXP BORDER POINTS
- BORDER VOLUMES FOR ALL BORDER POINTS

TO LEARN MORE, VISIT NATGASINTEL.COM/NA-MAP

Coast, that just provides more flexibility to the operators of the vessels that are using LNG as a marine fuel.

NGI: Is Pilot working on any other projects beyond the bunkering facility?

Cook: We have some international floating storage regasification projects in the works, but those are in the early stages of development and there's not a lot of details I can share. We've got our eye on other markets in North America for bunkering operations too, but again, it's too early to talk about.

**Excerpts in this segment have been edited for brevity and clarity. ■*

CANADIAN EXPORTS

AltaGas Secures Second 25-Year BC Propane Export License

After a year of overseas sales growth, the pioneer of propane tanker loadings on the north Pacific coast of British Columbia (BC) has doubled the volume authorized for its international traffic in the natural gas byproduct.

AltaGas Ltd. has obtained a second 25-year export license for 40,000 b/d from the Canada Energy Regulator (CER). The Covid-19 pandemic did not stop full use -- and more -- of the Calgary firm's first 40,000 b/d license.

By averaging 41,460 b/d in 2Q2020 at the C\$500 million (\$375 million) Ridley Island Propane Export Terminal (RIPET) near Prince Rupert, AltaGas used a 15% "annual tolerance" in CER export permits.

RIPET opened in mid-2019 at a former coal dock site, with none of the fuss that fossil fuel foes raise against oil and gas pipeline projects and tanker traffic increases elsewhere in the province.

Propane travels by train to the north Pacific terminal. The Prince Rupert seaport routinely loads jumbo freighters with other bulk commodity exports delivered on rails from inland Canada such as grain.

AltaGas set a year-end RIPET traffic target of 50,000 b/d. The terminal helped the utility and processing firm stay profitable in the pandemic, with net income of C\$485 million (\$364 million) in the first half of 2020, on revenue of C\$2.9 billion (\$2.2 billion).

The successful request for a second export license projected a winning combination of abundant propane supply from the liquids-rich Montney formation that straddles northern BC and Alberta, plus strong overseas demand.

Output of the byproduct is expected to grow as a result of liquefied natural gas (LNG) exports from BC projects currently under construction, including the Royal Dutch Shell plc-led LNG Canada terminal near Prince Rupert at Kitimat and the related Coastal GasLink supply pipeline from the Montney region.

On the demand side of the international propane market, AltaGas filings at the CER, prepared by consulting firm Goobie Tulk Inc. (GTI), predicted that "over the longer term, market fundamentals will prevail."

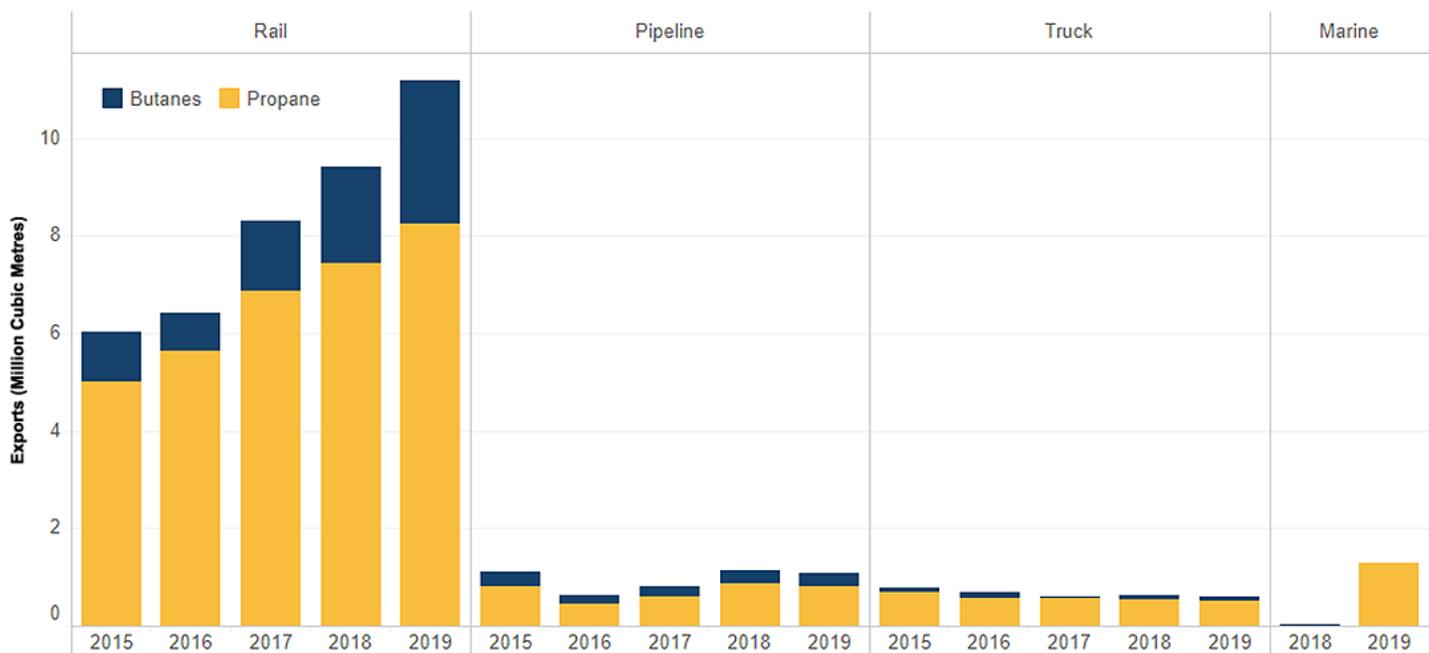
Liquid byproducts of natural gas escaped the worst damage Covid-19 did to overseas LNG consumption and prices. Gas-liquids exports from the United States alone stayed in a range of 800,000-1 million b/d as the pandemic hit, according to the AltaGas filings.

The new CER license allows exports overland to the United States as well as by sea.

"The competitive advantage of west coast export facilities allows them to operate at high utilization rates even

...cont' pg. 10

Annual Canada Propane & Butane Exports by Mode of Transportation, 2014–2019



Note: Data as of May 2020.

Source: Canada Energy Regulator

See NGI's LNG Glossary Here

in difficult market conditions," according to AltaGas and GTI.
 RIPET boasted of a 10-day tanker trip time to Asia, two weeks less than Gulf of Mexico terminals. ■

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Latin America DES Prices 24-Aug-2020

Country	Terminal	\$/US/MBtu					
		Sep	Chg	Oct	Chg	Nov	Chg
Argentina	Bahia Blanca	3.19	0.28	3.55	0.23	4.45	0.12
Brazil	Pecem	2.90	0.27	3.26	0.23	4.16	0.12
Chile	Quintero	3.20	0.27	3.56	0.23	4.46	0.12
Colombia	Colombia	2.68	0.27	3.04	0.23	3.94	0.12
Mexico East	Altamira	2.60	0.27	2.96	0.23	3.86	0.12
Mexico West	Manzanillo	3.09	0.27	3.45	0.23	4.35	0.12
Panama	Costa Norte	2.70	0.27	3.06	0.23	3.95	0.12



For more regional coverage of Latin America, please see NGI's Mexico Gas Price Index at natgasintel.com/news/mexico-gas-price-index

Source: NGI calculations, CME Group, CSI, Fearnleys

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