

LNG Review September 2021

- Recent issues and events -

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Introduction

The unprecedented global gas price rally continued in September 2021, with spot prices in Northeast Asia and Europe nearly doubling in one month and the one in the United States gaining 30%. They were 6.5, 7.3 and 2.3 times more expensive than a year ago, in Northeast Asia, Europe, and the United States, respectively. The spot gas prices in Northeast Asia and Europe have kept hefty premium against crude oil for two months.

Spot prices of natural gas (assessed spot LNG in Asia) and crude oil				
	Northeast Asia	Europe	United States	Brent
September 2021	33.10	33.18	5.87	13.64
August 2021	17.55	17.46	4.38	12.44
September 2020	5.10	4.56	2.53	7.35
(Unit) USD / million Btu (Source) Data from ICIS, ICE, CME				

Inventory levels in European gas storage rose noticeably in September 2021, although the overall level in the European Union and the United Kingdom was still relatively low at 74.6%, against 94.7% in September 2020 and 82.2% in September 2018. As the levels in Germany and the Netherlands were particularly low at 67.6% and 58.4% of the respective nominal capacities, the level of the rest of EU and the United Kingdom combined was 80% of the aggregated capacity, compared to 95.5% in September 2020 and 81.3% in September 2018.

European (including the United Kingdom) gas storage fullness				
	Germany	Netherlands	Others	Eu+GB
September 2021	67.60%	58.39%	80.04%	74.63%
August 2021	59.58%	48.09%	74.03%	69.37%
September 2020	94.33%	90.93%	95.53%	94.71%
September 2018	80.17%	91.23%	81.27%	82.23%
Gain in September 2021	13.5%	21.4%	8.1%	7.6%
(Source) Based on data of GIE (Gas Infrastructure Europe)				

* The writer belongs to Gas Group, Fossil Energy and International Cooperation Unit. Some information pieces that some readers may consider very important may not be included due to different reasons.

The Northeast Asian LNG market witnessed more carbon-neutral LNG and carbon/GHG-offset LNG deal announcements in September. Japan's INPEX delivered a cargo each to Shizuoka Gas and Toho Gas. Toho Gas is expected to receive another carbon neutral/offset LNG cargo from Sakhalin Energy in October. Malaysia's PETRONAS announced in late September a deal with China's Shenergy for three carbon neutral LNG cargoes to Shanghai. bp announced earlier that the company and CPC Corporation, Taiwan, reached an agreement for the delivery by bp of a carbon offset LNG cargo to CPC.

[Asia Pacific]

Shizuoka Gas Co., Ltd. and INPEX Corporation announced on 1 September 2021 their carbon-neutral LNG transaction. The shipment arrived at the Sodeshi LNG Terminal operated by Shimizu LNG Co., Ltd. later.

Kawasaki Kisen Kaisha, Ltd. ("K" LINE) announced on 21 September 2021 that it had decided to procure eight 7,000 units class car carriers fuelled by LNG from FY2023 to FY2025, following the company's first LNG-fuelled vessel, "CENTURY HIGHWAY GREEN" which was delivered on 12 March. "K" Line has made an agreement to order two each of the new vessels from NIHON SHIPYARD CO., LTD., SHIN KURUSHIMA DOCKYARD CO., LTD., and CHINA MERCHANTS JINLING SHIPYARD (NANJING) CO., LTD., respectively.

Mitsui O.S.K. Lines, Ltd. (MOL) and its group company Nihon Tug-Boat Co., Ltd. announced on 2 September 2021 that the latter-operated LNG-fueled tugboat Ishin was supplied with Carbon Neutral LNG (CNLNG) fuel by Osaka Gas Co., Ltd. and Daigas Energy Co., Ltd. on 1 September. This marks the first use of CNLNG as vessel fuel in Japan. The CNLNG was supplied from a tank-truck to the ship at the wharf in Sakai Senboku Port, Osaka.

bp and NYK Line announced on 15 September 2021 that the companies had signed a memorandum of understanding (MOU) to collaborate on fuels and transportation solutions to help industrial sectors, including shipping, decarbonise. The companies will collaborate and identify opportunities to help transition from current marine fuels to alternatives such as LNG, biofuels, and methanol, and to develop future fuels such as ammonia and hydrogen.

According to Vietnam Investment Review under the Ministry of Planning and Investment, AES Corporation and PetroVietnam Gas JSC (PV Gas) signed a joint venture agreement for the Son My LNG terminal in Bình Thuận province in south central Vietnam in late September 2021. The terminal is expected to begin commercial operations in 2026. The terminal complements AES' 2.2 GW CCGT Son My 2 power plant. AES was officially granted approval by the Vietnamese government to develop the power plant in September 2019. The plant will have a 20-year contract with the Vietnamese government.

JERA announced on 27 September 2021 that it had decided to acquire approximately 27% of the outstanding shares of Aboitiz Power, a major power utility in the Philippines, and executed a share purchase agreement with its holding company. JERA and Aboitiz Power are exploring collaboration including the potential joint development of power projects (including LNG-to-Power), collaboration on new generation technologies. JERA has also signed a memorandum of understanding with Aboitiz Power to collaborate in fuel sourcing and management of LNG.

The Shanghai Petroleum and Natural Gas Exchange (SHPGX) on 29 September 2021 launched a spot pricing index for LNG imports.

bp Singapore announced on 6 September 2021 that it has delivered its carbon offset LNG cargo to CPC Corporation, Taiwan, to the Yung An terminal in September 2021 and was sourced from bp's LNG portfolio. This is bp's first delivery of carbon offset LNG in the Asia-Pacific region, following its first delivery globally to Sempra LNG at the Energía Costa Azul terminal in Mexico in July 2021.

New Fortress Energy (NFE) and the government of Sri Lanka announced on 21 September 2021 that they had executed a definitive agreement for NFE's investment in West Coast Power Limited (WCP), the owner of the 310 MW Yugadanavi Power Plant based in Colombo, along with the rights to develop a new LNG Terminal off the coast of Colombo. NFE will acquire a 40% ownership stake in WCP and plans to build an offshore LNG receiving, storage and regasification terminal located off the coast of Colombo. NFE will initially provide the equivalent of an estimated 1.2 million gallons of LNG (~35,000 million Btu) per day (0.248 million tonnes per year) to the GOSL.

The Australian government announced on 1 October 2021 that it had developed an Emissions Reduction Fund (ERF) method to credit abatement from new carbon capture and storage projects. The government will award large-scale CCS projects that capture and permanently store carbon underground with tradeable high-integrity units (Australian Carbon Credit Units (ACCUs)).

Santos announced that it would commence the process to apply to register the Moomba CCS Project with the Clean Energy Regulator and generate Australian Carbon Credit Units (ACCUs). The project will store 1.7 million tonnes per year of carbon dioxide in the same reservoirs that held oil and gas.

Australia's Beach Energy announced on 27 September 2021 that it had entered into a Heads of Agreement (HOA) with bp for all 3.75 million tonnes of Beach's expected LNG volumes from the Waitsia Gas Project Stage 2, with supply forecast to commence in H2 2023. Supply will be delivered on a Free on Board (FOB) basis from the NWS (North West Shelf) facilities in Karratha, Western Australia. The agreed LNG price is linked to both Brent and

Japan Korea Marker (JKM) price indices.

INPEX announced on 13 September that it had made carbon neutral arrangements for a shipment of LNG from the Ichthys LNG project to be supplied to Toho Gas.

Santos, as operator of the Bayu-Undan Joint Venture, announced on 14 September 2021 that it had signed a Memorandum of Understanding (MOU) with the Timor-Leste regulator Autoridade Nacional do Petróleo e Minerais (ANPM) to progress Carbon Capture and Storage (CCS) at Bayu-Undan in the Timor Sea.

Malaysia's PETRONAS announced on 29 September 2021 that a fire broke out at the PETRONAS LNG Complex (PLC) in Bintulu on 28 September 2021 at approximately 4.15 p.m. The incident occurred at the sea cooling water outfall channel located outside PLC's process area. The plant's emergency response team extinguished the fire by 4.41 p.m. The operations at PLC remained unaffected.

BASF announced on 2 September 2021 that PETRONAS had selected BASF's OASE® purple for its Acid Gas Removal Unit process for PFLNG DUA Floating LNG (FLNG) project. Together with PETRONAS and Japan's JGC Corporation, PFLNG DUA was started up in February 2021 and completed its Performance Test Run in May 2021.

PETRONAS announced on 30 September 2021 that it had signed an agreement with China's Shenergy Group Company Limited for the delivery of three carbon neutral LNG cargoes from PLC. The deal will see PETRONAS' first delivery of carbon neutral LNG to China, to Shenergy's terminals in Shanghai between October 2021 and March 2022.

Australia's Santos and Oil Search announced on 10 September 2021 that they had entered into a Merger Implementation Deed (MID). The companies have completed reciprocal confirmatory due diligence, which commenced on 6 August.

According to reports, Papua New Guinea's government executed Heads of Agreement (HOA) on P'nyang Gas Agreement along with an Equity Purchase HOA with ExxonMobil. The state's take is at 63% in this deal compared to 49% in PNG LNG and 51% in Papua.

[North America]

The Industrial Energy Consumers of America (IECA) sent a letter of 17 September 2021 to the Energy Secretary on LNG exports. IECA urged the Department of Energy (DOE) to take action under the Natural Gas Act (NGA) to prevent a supply crisis and price spikes for consumers in winter 2021/2022 by requiring LNG exporters to reduce export rates.

According to an announcement from the White House, the Major Economies Forum on Energy and Climate (MEF) on 17 September 2021 addressed four topics, including potential participation in the Global Methane Pledge to be launched at COP 26. The Global

Methane Pledge, an effort co-initiated by the United States and the European Union, will involve a collective goal of reducing global methane emissions by at least 30% below 2020 levels by 2030 and implementation of related domestic actions.

The Federal Energy Regulatory Commission (FERC) granted Cheniere permission to introduce feedgas to Train 6 at the Sabine Pass LNG plant in Louisiana on 22 September 2021.

The first liquefaction train of the Golden Pass LNG plant in Texas, a joint-venture of Qatar Petroleum (QP) and ExxonMobil, is scheduled to come online by 2024, according to a webinar hosted by the USQBC (US-Qatar Business Council).

Venture Global LNG and PGNiG (Polish Oil and Gas Company) announced on 2 September 2021 that they had finalized the LNG sales deal for an additional 2 million tonnes per year of LNG from Venture Global to PGNiG for 20 years. Cargoes will be supplied from Venture Global's Calcasieu Pass LNG and Plaquemines LNG export facilities.

ExxonMobil said on 7 September 2021 that it had signed an agreement with an independent validator, non-profit MiQ, to begin the certification process for natural gas produced at its Permian Basin facilities at Poker Lake, New Mexico.

Tallgrass Energy and Project Canary announced on 28 September 2021 a multi-year partnership that would make Tallgrass' Rockies Express Pipeline (REX) the first interstate natural gas transmission pipeline in the United States to receive a comprehensive and independent environmental assessment and certification from Project Canary. Tallgrass Energy said that REX would be the first pipeline to implement real-time emissions detection and monitoring across all of its compressor stations.

PennEast Pipeline said on Monday 27 September 2021 it would stop developing a proposed pipeline from Pennsylvania to New Jersey, the latest in a series of natural gas lines to run aground due to legal and regulatory challenges, according to reports.

Crowley Maritime Corporation announced on 1 September 2021 that it had signed a long-term time charter with Shell NA LNG, LLC, providing for the building and operation of a new LNG bunker barge built in the United States. The barge will be the largest Jones Act-compliant vessel of its kind.

Stabilis Solutions announced in the middle of September 2021 that it had signed Memorandum of Understanding (MoUs) with Port Isabel Logistical Offshore Terminal, Inc. (PILOT) in Texas and the Cameron Parish Port, Harbor & Terminal District (CPP) in Louisiana, respectively, to facilitate the use of LNG as a marine fuel at the Ports. Stabilis will deploy its existing fleet of mobile cryogenic assets, including LNG transportation and distribution equipment, and provide LNG from its liquefaction facilities George West, Texas and Port Allen, Louisiana, to support LNG fuelling operations. LNG bunkering services are

expected to be available at PILOT in early 2022 and at CPP by the end of 2021.

Chevron announced on 9 September 2021 the signing of agreements to form a joint venture with Mercuria Energy Trading to own and operate American Natural Gas LLC (ANG) and its network of 60 compressed natural gas (CNG) stations across the United States.

Chevron announced on 14 September 2021 plans to invest more capital to grow lower carbon energy businesses. The company set the following 2030 growth targets for new energy businesses: Grow renewable natural gas production to 40,000 million Btu per day to supply a network of stations serving heavy duty transport customers; Increase renewable fuels production capacity to 100,000 barrels per day; Grow hydrogen production to 150,000 tonnes per year; and Increase carbon capture and offsets to 25 million tonnes per year. The company expects to invest more than USD 10 billion between now and 2028.

According to an announcement, eleven companies have expressed interest in supporting the large-scale deployment of carbon capture and storage (CCS) technology in Houston. Calpine, Chevron, Dow, ExxonMobil, INEOS, Linde, LyondellBasell, Marathon Petroleum, NRG Energy, Phillips 66 and Valero have agreed to begin discussing plans that could lead to capturing and safely storing up to 50 million metric tons of CO₂ per year by 2030 and about 100 million metric tons by 2040.

Clean Energy Fuels Corporation announced on 21 September 2021 that it would supply World Fuel Services, Inc. with an estimated 78 million gallons of LNG for two Pasha Hawaii container ships.

Southern California Gas Co. (SoCalGas) announced on 27 September 2021 agreements that are expected to resolve substantially all material civil litigation against SoCalGas related to the 2015 Aliso Canyon natural gas storage facility leak. As a result of the agreements, SoCalGas will record an after-tax charge of approximately USD 1.1 billion.

According to CBC News Canada, Coastal GasLink staff have been unable to work at its construction site in northern British Columbia since 20 September 2021 due to demonstrators.

The First Nations Major Projects Coalition (FNMPC) and Miawpukek First Nation (MFN) announced on 21 September 2021 plans to work towards increased equity participation in the LNG Newfoundland & Labrador Limited project (LNG NL), representing the first ever First Nations equity participation in an offshore energy project in LNG NL is a NL-owned and operated corporation focused on developing LNG infrastructure to monetize natural gas in the offshore Jeanne d'Arc Basin. The project requires a centralized offshore gas hub, a pipeline, and natural gas liquefaction and export facilities at Grassy Point, Placentia Bay, NL.

[Middle East]

bp, ADNOC and Masdar announced on 16 September 2021 that they had signed three agreements on potential investment into clean and low carbon energy.

Qatar Petroleum (QP) and China National Offshore Oil Corporation (CNOOC) announced on 29 September 2021 that they had entered into a long-term sale and purchase agreement (SPA) for 3.5 million tonnes per year of LNG over a 15-year period starting January 2022. In September 2009 the first LNG cargo was delivered to CNOOC. QP said as of August 2021, Qatar had delivered a total of 715 LNG cargoes to China, of which 270 cargoes (more than 24 million tonnes) were delivered to CNOOC.

Italy's Edison announced on 20 September 2021 that it had won the arbitration against Qatargas relating to the price review of the long-term contract for the purchase of LNG from Qatar. The ICC (International Chamber of Commerce) has notified the parties the decision related to the arbitration proceeding started in 2019 by Qatargas against Edison to obtain an increase in the contract price. Through the contract with Qatargas, Edison imports about 6.5 bcm per year of LNG to Italy from Qatar through the Rovigo regasification terminal.

[Africa]

TotalEnergies confirmed in late September 2021 an extended schedule of the Mozambique LNG production, with first gas expected in 2026.

[Europe / Russia]

A report by OIES on 27 September 2021 analyses drivers behind the latest gas pricing fluctuation in Europe and offers an outlook for the coming winter. To avoid distorting effects of the COVID-19 pandemic in 2020, the report compares the year to date (January-August) 2021 with the same period in 2019.

The European Environment Agency published on 1 September 2021 a report on EU shipping emissions. According to the report, ships carrying 77% of external trade and 35% of intra-EU trade are much more emissions efficient than land and air transport. Still, the maritime sector accounts for 13% of the EU's greenhouse gas emissions. In the medium term "conventional and low carbon fossil fuels are expected to continue being used," it said.

TotalEnergies said in its Strategy & Outlook presentation on 28 September 2021 that the company planned to increase its energy production by 30% from now to 2030, with growth coming half from electricity, essentially from renewables, and half from LNG. Its sales mix will evolve to 30% oil, 50% gas, 15% electricity and 5% biomass and hydrogen by 2030. TotalEnergies will maintain discipline on its investment program, which will be USD 13 - 15 billion per year for 2022 - 25 and will allocate 50% of these investments to growing its

activities and 50% to maintaining the base of its activities. 50% of the growth investments will be dedicated to the development of new energies, mainly renewables and electricity, and the other 50% to natural gas, essentially LNG.

TotalEnergies, Air Liquide, and VINCI announced on 1 October 2021 that they were combining forces with other large international companies to sponsor the creation of the world's largest fund exclusively dedicated to clean hydrogen infrastructure solutions. The fund aims to reach €1.5 billion and has already secured initial commitments of €800 million. The fund will invest in the entire value chain of renewable and low carbon hydrogen, in the most promising regions in the Americas, Asia and Europe.

Brittany Ferries announced on 21 September 2021 the start of construction of LNG bunker facilities in Bilbao, Spain, by Repsol. The bunker terminal will be completed in the first half of 2022. A separate LNG bunker facility will be constructed by Repsol in Santander.

Black Sea Oil & Gas SA together with its co-venture partners, Petro Ventures Resources SRL and Gas Plus Dacia SRL announced on 22 September 2021 the installation of the Ana gas production platform, the first offshore platform built and installed in Romania in the past 30 years. The gas coming from the Ana and Doina reservoirs are collected and measured on the platform, then delivered to the onshore 1 bcm-per-year gas treatment plant through a 121 km subsea and 4.5 km onshore pipeline. The overall completion for the Midia Gas Development Project (MGD Project) is at 70%.

According to preliminary data, Gazprom produced 357.7 bcm of gas in the first 8.5 months of 2021, which is 17.8% (or 53.9 bcm) more than in the same period of 2020. The company increased its gas exports to the countries beyond the FSU to 138.6 bcm. Gazprom continues to keep the amounts of its gas supplies near the all-time high level (141.3 bcm for the same period of 2018). This is higher than the figure for the same period of 2020 by 17.4% (or by 20.6 bcm).

Russia's Gazprom announced on 10 September 2021 that the construction of the Nord Stream 2 gas pipeline was fully completed at 8:45 am (Moscow time) earlier in the morning. Germany's regulator Bundesnetzagentur said on 13 September that it would take four months to complete a certification of the pipeline.

Gazprom announced on 27 September 2021 that the company and MVM CEEnergy had signed two long-term contracts for supplies of Russian gas to Hungary. Both contracts, which in total envisage supplies of up to 4.5 billion cubic meters of gas per year, will be effective for 15 years. Gazprom said that an important component of the new arrangements was the diversification of supply routes. Gazprom announced on 1 October that Hungary and Croatia started receiving Russian natural gas via the TurkStream gas pipeline and across the national gas transmission systems of Bulgaria, Serbia, and Hungary.

Gazprom announced on 9 September 2021 that RusKhimAlyans, Linde, and Renaissance Heavy Industries signed an EPC contract to build a natural gas liquefaction plant within the Gas Processing Complex near Ust-Luga (GPC operator RusKhimAlyans is a joint venture of Gazprom and RusGazDobycha). The consortium of Linde and Renaissance Heavy Industries is going to provide for the design works and supplies of equipment and materials, as well as to perform the construction and installation of two production trains with a total capacity of 13 million tonnes per year of LNG.

Russia's NOVATEK announced on 8 September 2021 that its subsidiary Yamal LNG Resource had won the auctions for geological survey, exploration, and production licenses for two subsoil license areas, which includes the Arkticheskoye and Neytinskoye fields on the Yamal Peninsula in the Yamal-Nenets Autonomous Region. The fields have combined estimated hydrocarbon reserves of 2.9 billion barrels of oil equivalent (boe), including 413 billion cubic meters (bcm) of natural gas and 28 million tonnes of liquids, according to the Russian hydrocarbon classification system. The license terms are for 27 years.

Mitsui O.S.K. Lines, Ltd. (MOL) announced on 2 September 2021 that it had signed a Letter of Intent (LOI) with "State Transport Leasing Company" (GTLK), a state owned leasing company under the Ministry of Transport of the Russian Federation, for the potential acquisition of total 49% shares of the FSU (Floating Storage Unit) owner companies, which are currently 100% owned by GTLK, in relation to the LNG transshipment projects in Kamchatka and Murmansk.

Arctic LNG 2 announced on 21 September 2021 that the first modules for LNG Train 1 had been delivered by the EPC contractor, a joint venture of Technip Energies, Saipem and NIPIGAS. The two first pipe-rack modules were shipped from the Zhoushan port in China to the NOVATEK-Murmansk LNG Construction Center and will be further skidded onto the Gravity Base Structure (GBS) platform of LNG Train 1. Overall, 14 modules will be delivered from contractors' shipyards for the first LNG train.

Mitsui O.S.K. Lines (MOL) announced on 14 September 2021 that it had signed time charter contracts for four newbuilding LNG carriers with NOVATEK.

NOVATEK and the Japan Bank for International Cooperation (JBIC) announced on 2 September 2021 that they had signed a Strategic Cooperation Agreement on low-carbon projects to produce hydrogen and ammonia, carbon capture, utilization, and storage technologies, as well as renewable energy projects in Russia, including ammonia and hydrogen production projects in the Yamal Peninsula.

In respect of court hearings regarding Deputy Chairman of NOVATEK Management Board Mark Gyetvay, NOVATEK made the following statement on 24 September 2021. ". . . Gyetvay is in the process of court hearing in the United States regarding alleged personal tax

evasion. The Company is not involved in the litigation and does not have any details of the court hearings. NOVATEK monitors the situation and will give all necessary support."

Sakhalin Energy announced on 28 September 2021 that the company and Toho Gas (Japan) had agreed on the delivery of the first carbon neutral/offset LNG cargo from the Sakhalin-2 project to Toho Gas. Sakhalin Energy and Toho Gas have expressed their intention of a strategic partnership. According to the announcement, the first shipment will take place in early October. The cargo will be delivered by the Russian gas carrier Grand Aniva to Chita LNG Terminal, Aichi Prefecture.

The government of Russia's Sakhalin Oblast, Rosatom, Russian Railways and Transmashholding (TMH) on 3 September 2021 signed a protocol concerning a project for organising a railway service using hydrogen fuel cell trains on Sakhalin Island.

Rosneft announced on 29 September 2021 that it and ExxonMobil had signed a Memorandum of Understanding (MOU) to cooperate to assess the potential of lower-carbon technologies.

Rosneft announced on 29 September 2021 that it and Equinor had signed a Cooperation Agreement on carbon management. The companies will assess their joint projects for the potential of using technologies and equipment for detection, measurement and reduction of greenhouse gas emissions, primarily, of methane emissions, and will also strive to achieve zero routine flaring of associated petroleum gas by 2030. Rosneft and Equinor will look into the prospects for implementation of new projects envisaging the use of alternative energy sources, including wind energy, application of CO₂ capture and storage technologies, and development of hydrogen business ("blue" and "green" hydrogen). The companies will join their efforts to develop low-carbon design standards for new and existing joint projects in the Upstream.

[South America]

Höegh LNG Partners LP announced on 24 September 2021 an agreement with New Fortress Energy (NFE) to charter the Höegh Gallant for FSRU operations for a period of ten years, with a planned commencement during the fourth quarter of 2021.

bp Trinidad and Tobago LLC (bpTT) announced on 20 September that its Matapal project had achieved first gas. Matapal is bpTT's second subsea development. Its three wells tie back into the existing Juniper platform. Matapal will deliver gas into the Trinidad gas market with production expected to be in the range of 0.250 - 0.350 bcf per day.

Reference: Company announcements, Cedigaz News Report.

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