LNG Unlimited

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# Kinder Morgan Elba Island plant delays start-up until early 2019

**CEO Steven Kean outlines his vision of Kinder Morgan benefits from LNG export boom**

**LNG Journal editor**

**Work on Georgia's first export facility behind schedule**

US pipeline and storage company Kinder Morgan said it expected the first Train of its Elba Island LNG export plant near Savannah in Georgia to come on stream in the first quarter of 2019 while the company was also benefitting from the feed-gas needs at other liquefaction ventures.

Elba Island is an existing import terminal being transformed into an export plant to produce an initial 2.5 million tonnes per annum of LNG.

Kinder Morgan, based in Houston, had earlier given a start-up date for Elba Island as the fourth quarter of 2018 from the third quarter previously.

## Cost controls

"We have a delay, but I think we are going to be alright from a cost perspective," said Chief Executive Steven Kean without disclosing other details.

The CEO was speaking at a conference in New York when he also made the point that Kinder Morgan supplied more than 40 percent of the current US liquefaction capacity with feed-gas that moves through its pipelines.

It was also expecting to increase this feed-gas market share as more US export plants came on stream along the Gulf Coast in Louisiana and Texas.

"We are benefiting from the growth in both supply and demand, on both ends of our system," explained Kean.

The Elba Island LNG project involves the installation of 10 small-scale liquefaction units and modifications to the terminal infrastructure.

Royal Dutch Shell was the former partner of Kinder in the Elba island project and while it sold its stake, it remains the main customer for the completed venture.

Kinder's new partner in the LNG project since 2017 is the investment fund EIG Global Energy.

EIG purchased a 49 percent joint venture participation in Elba Liquefaction Co. for an upfront cash payment of $385 million and is funding its share of future capital expenditures.

The existing terminal on Elba Island is about eight miles upstream from the mouth of the Savannah River. It was first authorized by the Federal Energy Regulatory Commission in 1972 as an import facility.

The transformation project to turn the terminal into a liquefaction plant began in November 2016.

Construction work at Elba Island is led by the US subsidiary of Japan's IHI Engineering & Construction, based in Houston.

Kinder Morgan and two equity funds are also making progress on receiving FERC permits to transform the existing Gulf LNG import terminal in Pascagoula in Mississippi into an export plant.

The proposed Gulf LNG export facility would consist of two Trains, each with capacity of about 5 MTPA.

At the New York event, Kinder Morgan also issued some of its financial projections for 2019. The company said it would invest more than $3 billion in expansion projects and in contributions to joint ventures.

It has proposed two gas pipelines in the Permian Basin in West Texas, where production is exceeding the capacity of available pipelines to deliver to customers on the Gulf Coast and in Mexico.

The company's Permian Highway Pipeline will be designed to transport up to 2 billion cubic feet per day from the Waha Hub area to the Gulf and Mexican markets.

The company's Gulf Coast Express is another project being worked on and will have 1.98 Bcf per day of capacity when it comes on line at the end of 2019.

## UNLIMITED AGENDA

# Alaska Gasline Development, Sinopec and Chinese banks expect to finalize LNG development accord

**LNG Journal editor**

Alaska Gasline Development Corp., the state-owned company developing the Alaska LNG project, is expected to sign a final joint development agreement with Chinese companies and banks by the end of the first quarter of 2019.

The AGDC has said that the announcement on December 1 of a 90-day pause on new tariffs between the US and China was a positive development in trade relations, though it had not changed Alaska's approach in progressing towards a final agreement.

## Consortium

The Chinese consortium and AGDC signed an preliminary accord on September 29 reaffirming their wish to reach a firm deal.

The Alaska LNG developers are expected to spend up to $45 billion to build an 800-mile gas pipeline from the North Slope in northern Alaska to a planned liquefaction plant in Nikiski on the Kenai Peninsula, south of Anchorage.

A gas processing plant, needed mainly to remove carbon dioxide from the Prudhoe Bay gas, would also be built on the North Slope.

**Graphic of how the liquefaction plant at Nikiski will look**

The joint development agreement has December 31 as its deadline for signing, though officials have said that the date may have to be pushed back by a month or so because a new state administration has just taken over in Alaska.

Republican Mike Dunleavy was sworn in as Alaska's new governor on December 3. The former governor, Bill Walker, was an independent and dropped his re-election bid in October.

Dunleavy, a Republican former state senator, won office by defeating Democratic former US Senator Mark Begich in November's election.

AGDC spokesman Jesse Carlstrom said the leaders of the state agency have continued to monitor what they refer to as the "trade friction" between the countries, which they viewed as short-term while the Alaska LNG project is regarded as a generational event.

China Petroleum & Chemical Corp., known as Sinopec, is a potential anchor customer for the project after it signed a non-binding agreement with AGDC in November 2017 to purchase up to 75 percent of Alaska LNG's expected 20 million tonnes per annum of output.

That final agreement will also detail the prospects of the Bank of China and China Investment Corp. correspondingly financing up to 75 percent of project development costs with a mix of debt and equity.

"All parties, AGDC and the joint development agreement parties, have proceeded through 2018 on the work to advance the project," said Carlstrom.

AGDC President Keith Meyer has said there were no signs from the Chinese negotiating team that the tariffs issue had slowed progress on the Alaska LNG deals.

Meyer explained that the project would be a major step towards balancing trade between the countries and thus should be part of resolving the bi-lateral economic tensions.

The resource side of Alaska LNG is still progressing with ExxonMobil signing a preliminary accord for the sale of its 13.8 trillion cubic feet of natural gas resources from its Prudhoe Bay and Point Thomson fields.

The ExxonMobil agreement followed a similar commitment of gas to the LNG project made in May 2018 by BP of the UK, also a major North Slope natural gas resource owner. ■

# Annova LNG planned for Brownsville Ship Channel advances with previously delayed permit process

The US Annova liquefied natural gas export project planned for the south bank of the Brownsville Ship Channel in Texas, and whose owners include Chicago-based power company Exelon Corp., is moving forward on a pipeline development.

The Annova joint venture proposes the construction of six small-scale liquefaction Trains producing a total of 6 million tonnes per year of LNG, as well as an interconnected pipeline and marine export facilities.

The Brownsville project was one of 12 ventures that the US Federal Energy Regulatory Commission issued new environmental schedules for in September 2018, shortening the waiting time for permits by up to a year.

Annova said the US Army Corps of Engineers had resumed its permitting process for the project pipeline in response to a data request submission.

"This resumption supports the timeline to receive federal approval by July 2019 as indicated by the FERC notice of schedule," said Annova.

Annova's commercial start-up of operations is scheduled for 2024.

The joint venture's equity owners in addition to Exelon are US engineering, processing and equipment company Black & Veatch of Kansas and construction firm Kiewit Corp., based in Omaha, Nebraska.

Annova explained that the Corps of Engineers now possesses the requisite information to conduct a detailed review of the environmental impacts of an intra-state natural gas pipeline necessary to deliver feed-gas to the project site.

The company said it was in the process of securing one billion cubic feet per day of firm natural gas transportation from Agua Dulce Hub in south Texas to the project site, representing the total natural gas needs for the 6 MTPA of output.

"Firm transportation capacity deliverable to Agua Dulce make South Texas a quickly evolving, low-cost supply hub with ready access to the Waha, Katy and Houston Ship Channel natural gas pricing hubs," said Annova Chief Executive Omar Khayum. ■

## First gas from last Timor Sea well to feed Darwin plant

Australian liquefied natural gas LNG stakeholder Santos said the first feed-gas had been produced from the third and final well of the Bayu Undan gas and condensate field offshore northwest Australia for the Darwin LNG plant operated by ConocoPhillips.

A final investment decision had been made in January 2017 as part of the long-term development plan for the Bayu Undan field located in the Timor Sea.

The drilling programme consists of two platform wells and one subsea well connecting into existing offshore infrastructure.

Santos said the delivery of the whole project was under budget and ahead of schedule. Santos holds an 11.5 percent interest in the Bayu Undan field as well as the Darwin LNG facility.

Santos, which is operator of the Gladstone LNG plant in Queensland and a shareholder in the Papua New Guinea LNG plant and its expansion, also has a 25 percent interest in the Barossa gas field joint venture affiliated to Darwin LNG.

"The Barossa gas field is currently in front-end engineering and design and is the leading candidate to backfill Darwin LNG when Bayu Undan production ceases," explained Santos.

"Barossa would more than double Santos' production in Northern Australia with a final investment decision targeted for late 2019," added the Adelaide-based company.

The Darwin facility was the nation's second to come on stream in 2006 after Western Australia's North West Shelf plant operated by Woodside Petroleum.

The single-Train Darwin plant ships its 3.7 million tonnes per annum of output to Japanese utilities.

# Australian port of Newcastle joins with South Koreans on LNG plan

**LNG Journal editor**

A South Korea-based liquefied natural gas project company has signed a development agreement with the Australian port of Newcastle, north of Sydney, to commence preliminary works on a proposed LNG import terminal using a floating storage and regasification unit.

Korean company Epik Co. said the project would be called Newcastle LNG and would serve the New South Wales natural gas market where prices remain higher than Asian LNG prices.

New South Wales port will focus on LNG as well as coal

### Demand

"Based on our assessment of the New South Wales gas market, particularly along coastal demand regions such as Newcastle and Sydney, we are confident that by importing LNG we will be able to provide an infrastructure solution that is capable of delivering a cost-efficient source of alternative gas supplies," said Jee Yoon, Epik Managing Director.

The Korean-led LNG regasification project is the second proposed for the state of New South Wales with a venture planned for Port Kembla, south of Sydney.

The developers of Newcastle LNG pointed out that the facility would be in one of Australia's largest ports and a major trade and logistics hub, making it an optimal area for a terminal.

"We are very excited to be working with Port of Newcastle and hope to expand our relationship by discussing other potential projects, such as a gas-fired power plant and an LNG bunkering facility," said Epik.

The Port of Newcastle's Executive Manager of Strategic Development, Ian Doherty, said the deepwater port was uniquely placed on Australia's east coast due to its significant land and channel capacity, making it an attractive location for the Newcastle LNG project.

"This type of development opportunity is consistent with our diversification plans and we're pleased to be supporting Epik as it conducts preliminary investigation work, especially given its potential benefits for the NSW economy," stated Doherty.

# Adnoc and Inpex plan LNG fuel bunkering in Mideast and Asia

Abu Dhabi National Oil Company (Adnoc), the energy and liquefied natural gas producer of the United Arab Emirates, has signed an agreement with Inpex Corp. of Japan to explore LNG bunkering opportunities in the Middle East and Southeast Asia.

The UAE is the oldest LNG producer in the Middle East from its Das Island plant offshore Abu Dhabi consisting of three Trains with nominal capacity of 5.5 million tonnes of LNG per annum.

Inpex for its part is the newest LNG producer after bringing on stream its Ichthys liquefaction and export plant in Australia's Northern Territory, a joint venture with French major Total.

The logistics and services unit of Adnoc has signed the framework agreement with Inpex on developing the bunkering activities.

The accord was signed by Abdulkareem Al Masabi, Chief Executive of Adnoc L&S, and Shigeharu Yajima, senior Vice President of Global Energy Marketing for Inpex.

The UAE's Das Island liquefaction and export plant was commissioned in 1977 and mainly supplies the Jera Co Inc. joint venture company formed by Japanese utilities Tokyo Electric Power Co. and Chubu Electric.

The UAE is also an LNG importer at facilities in Dubai and Ruwais to help meet its own domestic gas needs.

The Abu Dhabi plant exported 5.6 million tonnes of LNG last year and it could now be refurbished or de-bottlenecked to increase that total after new gas discoveries.

The use of LNG as a fuel for shipping is expected to grow significantly as ship owners seek new compliance solutions to meet the 2020 International Maritime Organization's global sulfur cap.

The UAE is strategically located to become a major bunkering hub In the Gulf and the Arabian Peninsula.

"Adnoc L&S has a long-established history in LNG shipping as well as bunkering operations," said Al Masabi, formerly a UAE tanker captain.

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## NEWS NUDGES

### GTT tanks ordered

French LNG storage tank technology company GTT said it received an order from the South Korean shipyard, Samsung Heavy Industries, for tank designs for a 174,000 cubic metres capacity LNG carrier on behalf of Greek ship-owner Minerva. The newbuild will be fitted with the Mark III Flex-plus membrane containment system developed by GTT and the vessel is scheduled for completion in the first quarter of 2021. "We are very pleased for the renewed trust of our excellent partner Samsung Heavy Industries as well as welcoming Minerva for its entry this year into the LNG industry," said GTT Chairman and Chief Executive Philippe Berterottiere.

### Burckhardt services

Burckhardt Compression, the Swiss-based maker of compressor systems for the oil and gas and LNG industries, has opened a service centre for its Central Europe business area. "The Service Center is strategically located in Slovakia in order to react fast on customer demands and to provide comprehensive services for reciprocating compressors of any brand to operators in Slovakia, Czech Republic, Hungary as well as Poland," said the company.

### Knutsen's smaller ship

The South Korean shipbuilder, Hyundai Mipo Dockyard Co., said it received an order from Knutsen Shipping of Norway for a small-scale LNG carrier with capacity of 30,000 cubic metres and worth $77 million. "Hyundai Mipo will deliver the ship by the first quarter of 2021," said the yard, a subsidiary of Hyundai Heavy Industries, the world's biggest shipbuilder by orders.

# Canadian Woodfibre LNG project moves forward with First Nation

LNG Journal editor

Squamish First Nation Council voted to support LNG plan by eight votes to six. The plant will replace a pulp mill

The Canadian Woodfibre LNG project proposed for the district of Squamish in British Columbia has reached final agreement with the Squamish First Nation, giving the native people benefits of more than C$225 million (US$170M) in cash over the planned 40 years of operations.

The project is backed by Indonesian businessman Sukanto Tanoto and his Singapore-based Pacific Oil & Gas Ltd, part of the Royal Golden Eagle Group and has full regulatory permit approvals in place.

### Brownfield

The liquefaction plan will be built on the site of a former pulp mill at Squamish, north of Vancouver, and is licensed to export more than 2 million tonnes per annum of LNG.

The relatively small-scale project is expected to begin building in the first quarter of 2019 and to start commercial operations in about four years' time.

"As a company, we are pleased to have fulfilled another key condition of the Squamish Nation's environmental certificate," said Woodfibre Vice President Byng Giraud in relation to the agreements passed by the Squamish First Nation Council. "We believe the Squamish Nation process and the resulting conditions are an important pathway to economic reconciliation," he added.

The First Nation Council voted to support the project by eight votes to six and requires Woodfibre to meet 25 legally binding environmental conditions.

"The next steps will be holding the proponents accountable through the construction, operation and decommissioning of the Woodfibre LNG project," said the First Nation Council statement.

"This includes environmental, cultural, employment, and training conditions. As agreed by the proponents, we will be co-developing management plans for the project and will have our own monitors on the ground to report any non-compliance," explained the First Nation.

"Similar to other levels of government that benefit economically from the project, the Squamish Nation as a government will share in the economic benefits this project offers," it added.

"Revenue collected from this project will go to the Squamish Nation and contribute to programs and services it operates for its members. In addition, there will be jobs and training opportunities and spin-off business opportunities for members," stated the Council.

The Squamish project is one of the few moving forward on the Canadian West Coast where more than a dozen were previously planned.

# Spain's Repsol completes largest LNG bunkering for Canadian newbuild

Spanish energy company Repsol has completed its largest LNG bunkering operation by refueling a Canadian petroleum product tanker at the Cartagena import terminal in southeast Spain with 11 truckloads of fuel.

The refueled Canadian vessel was the "Paul A. Desgagnes", the third in a series of four product carriers being built at the Besiktas shipyard in Turkey for the Desgagnes shipping company, based in Quebec City in Canada.

The "Paul A. Desgagnes" is a tri-fuel vessel that can be powered by fuel oil, marine diesel oil or LNG. The newbuild is double-hulled and holds a Polar 7 ice-class confirming her capacity to navigate in ice-laden waters.

Desgagnes said that the "Paul A. Desgagnes" represented an investment exceeding C$50 million (US$38M), of which almost C$9M was spent on the dual-fuel and LNG motorization.

With a deadweight of 15,000 tons and with 7.8 metres draft, the cargo tanks can hold up to 17,505 cubic metres.

"Repsol has achieved another goal consolidating its position as LNG bunker spot supplier," said the Madrid-based company.

"Developing the LNG bunker business, both on a spot and mid-term to long-term basis, is one of the key work areas of Repsol's strategy to provide solutions to its clients, adding LNG to its portfolio of bunker fuels," added Repsol.

# Australian LNG output surges to record with almost half delivered to Chinese terminals

**LNG Journal editor**

Australian natural gas and oil production set new records in the third quarter and almost took the country to a run rate of one billion barrels of oil equivalent per annum, led by LNG output in Western Australia and the coming on stream of the Ichthys plant in the Northern Territory.

"National petroleum production gained a fresh burst of speed in the latest quarter thanks to an impressive start by Wheatstone LNG's Train 2 and strong performances by other west coast LNG projects," said the latest report from Australian consultants EnergyQuest.

## Strong

"There was strong performance by Australian LNG projects, shipping 18.1 million tonnes, up by 24 percent on the previous quarter," added the report.

Graeme Bethune, Chief Executive of EnergyQuest, said the start-up of the Ichthys project in October has placed Australia in a position to overhaul Qatar as the world's biggest LNG producer.

Gorgon LNG plant on Barrow Island in Western Australia

"Annualised LNG production in October hit 76 million tonnes per annum, while total LNG capacity reached 79.7 MTPA with the start of Train 1 at Ichthys. This exceeds Qatar's nominal capacity of 77 MTPA," stated the EnergyQuest CEO.

Chevron Corp., operator of the Wheatstone and Gorgon facilities in Western Australia, extended its lead over Royal Dutch Shell as Australia's largest producer in the third quarter with output of 45.9 million barrels of oil per day equivalent versus Shell's 36.0 MMboe.

EnergyQuest noted that Chinese natural gas demand was still growing rapidly as the Chinese government works to reduce some of the world's worst urban air pollution.

"China's LNG imports reached a record 13.2 million tonnes in the third quarter," said the report.

"Australia supplied 47 percent of Chinese LNG imports in the quarter. About one-third of the increase in Chinese LNG imports came from Australia, spread between Queensland (30 percent of the quarterly increase) and WA producers Wheatstone, Gorgon and the North West Shelf (70 percent of the quarterly increase)," explained the report.

EnergyQuest CEO Bethune said that "contrary to popular myth", the Queensland LNG projects were not "sucking gas" out of the East Coast market.

According to the consultant's data, the equity gas production by the three Queensland LNG plants was 336.3 petajoules (8.13 billion cubic metres) in the third quarter, representing a surplus of 0.61 Bcm over the 315.2 PJ (7.52Bcm) used for LNG production.

The three major coal-seam-gas-to-LNG plants in Queensland, Gladstone LNG, Australia-Pacific LNG and Queensland Curtis LNG, all achieved record gas production in the third quarter.

Capacity utilisation by the three coal-seam-gas-to-LNG plants in Queensland increased to 83 percent in the three months to the end of September compared with 77 percent in the second quarter.

"QCLNG and APLNG are managing to almost fill their LNG trains, while GLNG's capacity utilisation is still only around 60 percent," said the report.

# Hokkaido Electric starts small-scale LNG unit

Hokkaido Electric Power, the Japanese utility, said it started loading trucks with liquefied natural gas at its Ishikari import facility for a small-scale distribution business aimed at industrial customers.

The Ishikari terminal, which takes its name from the Ishikari River on which it stands, is one of Japan's newest and began commercial operations in 2012.

"With the acceptance of LNG, we have been able to start the gas supply business that delivers LNG to customers by tank truck," said Hokkaido Electric.

"We load LNG into the tank trucks and supply it to customers' receiving facilities," it added.

It named two of its industrial customers for LNG truck-loads as Japanese companies, Air Water Inc. and Iwatani Corp.

Two of the storage tanks at the Ishikari facility are owned by Hokkaido Electric and two others are reserved for Hokkaido Gas Co.

Three of the storage tanks have been completed and the fourth is under construction.

The Ishikari import terminal will support the small-scale LNG distribution business as well as the future demand from the Ishikari Bay New Port gas-fired power plant currently under construction.

The power plant comprises three 569-megawatt gas-fired power units.

The start of operations for the Ishikari Bay power plant is scheduled for February 2019, boosting power in the absence of closed nuclear plants.

# Asians offered Kawasaki floating power plant using LNG for $175M

**LNG Journal editor**

Kawasaki Heavy Industries of Japan has completed the development of a floating, gas-fired power plant to operate with LNG deliveries and aimed at Southeast Asia with its many islands and isolated communities unable to receive pipeline gas supplies.

Kawasaki is aiming to sell the ships to customers such as power companies in the fast growing Asia economies where infrastructure remains underdeveloped and at a time when LNG supplies are plentiful in the region.


**Floating power plants for LNG use are being offered in Asia**

## Capacity

"The vessel is the first of its kind able to generate 100,000 kilowatts of electricity," stated Kawasaki.

The power plant is designed to accept LNG supplies and is on a barge measuring about 100 metres in length.

"The barge is equipped with generators, fuel tanks to store the liquefied natural gas that fires them, and power distribution equipment," said Kawasaki.

The vessel will be assembled at a shipyard, towed to where it is needed and anchored to the sea floor.

"By putting the ship near where consumers are, power transmission distances can be shortened," the company pointed out.

Equipped with a high-efficiency gas turbine, the ship can generate between 30,000 kW and 160,000 kW of electricity, enough to supply power to between 100,000 and 160,000 homes.

"It will sell for around 20 billion yen ($175 million). Kawasaki Heavy's system will include a small fueling vessel, taking advantage of the company's skills in building LNG tankers," said Kawasaki.

"The gas-fired, floating power plant is 10 percent more efficient than a comparably sized coal-powered or oil-fired plant," it added.

Kawasaki said the plants required about four years each to build, though they can go online more quickly than land-based facilities because it requires almost no civil engineering.

"This will allow utilities to recoup their costs more quickly," the company added.

# Japan's main LNG firm Jera is still planning to build coal-fired plants

Jera Co. Inc., the largest Japanese liquefied natural gas importer with around 40 million tonnes per annum of requirements, said it was still replacing ageing oil-fired thermal power plants in Japan with coal-fired units instead of gas for economic reasons.

Jera has been completing the integration of the joint venture company formed by Tokyo Electric Power Co and Chubu Electric Power in 2017, combining their power assets and directing their global LNG purchasing and trading activities.

Japan's Minister of Economy, Trade, and Industry has just issued an Environmental Impact Statements for the two latest coal-fired generating units at the Yokosuka Thermal Power Station Kanagawa Prefecture, south of Tokyo.

In addition to its LNG imports, Jera also brings around 30 million tonnes per annum of coal shipments into Japan.

Jera agreed in July 2018 to merge its LNG activities with French firm EDF Trading Ltd. Under the deal the LNG trading activities of both EDF and Jera were merged into Jera Trading Pte. Ltd. (Jerat).

This transaction followed an earlier deal with coal trading involved when the Japanese firm completed the acquisition of EDFT's coal business in April 2017.

Jera's newest LNG volumes are coming from the Ichthys plant in Australia of Japan's Inpex Corp. and France's Total and from the Freeport LNG plant in Texas from 2019.

However, it is going ahead with new coal projects while at the same time has pledged to increase its gas-fired plants over time.

"The new Yokosuka-1 and Yokosuka-2 coal-fired power units will each have a capacity of 650 megawatts and will be commissioned in 2023 and 2024," said the Japanese environmental statement.

They will replace the current Yokosuka oil-fired units, which consists of six 350 MW oil-fired generators commissioned between 1964 and 1970, one 144 MW gas turbine dating from 2007 and a 30 MW emergency turbine in operation since 1971.

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# LNG maritime fuel sector helped by Singapore ban on open-loop exhaust-gas cleaners in its waters

**LNG Journal editor**

The growth of liquefied natural gas as a maritime fuel option when the 2020 sulfur limit enters into force has been boosted by the Port of Singapore's plans to prohibit the discharge of wash water from open-loop exhaust-gas cleaners into its waters.

The global shipping fleet is currently making preparations to comply with the International Maritime Organization (IMO) regulations to reduce air pollution by using cleaner fuel with a lower sulfur content of 0.5 percent compared with the current 3.5 percent limit.

### Switching

Analysts had said that between 2,500 and 4,500 ships were likely to install an exhaust-gas cleaning system, known as a scrubber, to meet the regulations instead of buying the more expensive low-sulfur fuel or switching to LNG.

Singapore is one of the main transit routes for LNG carriers and is the main Asian proponent of LNG as a bunkering fuel.

**Singapore Port CEO Andrew Tan explained the reasoning**

It has even made grants available for LNG bunkering vessels to be constructed and be operating in the port by 2020, along with low-sulfur fuel bunkering ships.

Andrew Tan, Chief Executive of the Maritime and Port Authority of Singapore, said the Asian port's restrictions on open-loop emission cleaners was aimed at protecting the marine environment.

He was making one of his last speeches as MPA CEO before being replaced by Quah Ley Hoon, who will take over the role from 1 January 2019.

"To ensure that the port waters are clean, the discharge of wash water from open-loop exhaust-gas scrubbers in Singapore port waters will be prohibited," said Tan.

"Ships fitted with open-loop scrubbers calling at Singapore will be required to use compliant fuel," he explained.

"Ships with hybrid scrubbers will be required to switch to the closed-loop mode of operation. Singapore, as a party to MARPOL Annex VI, will be providing reception facilities for the collection of residues generated from the operation of scrubbers," he added.

Fitting exhaust-gas cleaners to ships costs at least $2 million per commercial vessel.

The IMO low-sulfur regulations include an amendment stating that scrubbers can be used to meet the emissions restrictions.

However, the IMO prohibits the carriage by ships of non-compliant fuel unless the vessels have exhaust-gas cleaning systems fitted.

"As a major bunkering hub, we are working closely with our bunker suppliers to ensure that there will be adequate supply of compliant fuel oil in Singapore well in advance of 2020," said Tan.

"We will produce a list of suppliers that are able to supply compliant fuel by the middle of next year," he added.

The Singapore authorities said that to help prepare the industry for the IMO 2020 sulfur limit, it has developed a comprehensive action plan for all shipowners.

"Working together with the Singapore Shipping Association, we have published two technical guidance booklets, one for Singapore-registered ships and another one for ships calling at the Port of Singapore," said Tan. ■

# Thai state energy company PTT reports rising earnings and Mozambique LNG project progress

Thailand's state energy company PTT Exploration and Production said the he Mozambique LNG export project it is a part of is progressing well towards a final investment decision in the first half of 2019 as the joint venture partners sold more volumes.

PTT E&P is a 10 percent shareholder in the Area 1 licence of the Rovuma Basin offshore the south-east African nation held by Anadarko Petroleum of the US.

Other shareholders with PTT are Japanese trading house Mitsui & Co. and three Indian companies, Bharat Petro Resources, ONGC Videsh and Oil India Ltd., as well as the Mozambique state-owned oil and gas firm ENH. "PTTEP and its joint venture partners additionally secured a sales and purchase agreement with Tohoku Electric Power for 280,000 tonnes per annum and with Electricite de France, S.A. (EDF) for volumes of up to 1.2 million tonnes per annum to support the final investment decision, while first production is anticipated to commence in 2023," said PTT.

PTT E&P had earlier reported net profits in the third quarter of 10.40 billion Thai baht ($315 million) with increasing sales volumes from the Bongkot natural gas and condensate field in the Gulf of Thailand.

The Thai company acquired Royal Dutch Shell's 22 percent interest in the Bongkot field earlier in 2018 for $750M.

PTT E&P also boosted its nine-month performance by generating revenues of $3.96 billion, an increase of 22 percent compared with the same period of 2017.

"Our strong operating performance reflected the success of our investment strategy to refocus on our key areas like Southeast Asia," said Phongsthorn Thavisin, PTT E&P Chief Executive.

"Our increased stake in the Bongkot field, our core producing project, enabled higher sale volumes with immediate cash flow," added Thavisin. "We will keep prioritizing investments in strategic area through acquisitions in exploration blocks in petroleum prolific areas, both in the Middle East and Southeast Asia," stated the CEO.

PTT E&P is also renewing its expiring concessions in both Bongkot and Erawan fields offshore Thailand.

The company said it had solely submitted its bid for the Bongkot field, while partnering with United Arab Emirates-based Mubadala Petroleum in its bid for Erawan assets. PTT E&P said it was ready to be the operator in both fields. ■