

**FY2021 Q&A from the Online Earnings Release Conference (held on January 20, 2022)**

This content is based on information available on the date of the online earnings release conference (January 20, 2022).

**1. LNG Market Outlook from an EPC Contractor Perspective**

Question	Answer
Over the past year or two, what factors have delayed decisions on large LNG projects (except for Qatar), and what led you recognize that a turning point has been reached recently?	<p>Delays were mainly caused by lower energy demand due to the pandemic and, from the standpoint of ESG, by the fact that clients have been cautious about capital investment in consideration of necessary reductions in CO<sub>2</sub> emissions.</p> <p>Very tight supply and demand of natural gas led to record-high LNG prices, which has been one indicator of a turning point. We believe the tide may have turned with this renewed recognition of the important roles of natural gas, including LNG, in the energy transition.</p>
Would you say it is accurate to assume that investment in LNG projects will resume in 2023?	Assuming that global LNG demand will exceed supply around 2030, we expect to see some developments around 2023, in consideration of the time required for plant construction.
Having reached this turning point, might LNG investment resume even sooner?	Considering the longer view on investment that clients are taking and the multi-year time frame of construction projects, we have the impression that rather than implementing current plans sooner, customers are making quiet progress before the tight supply and

	demand anticipated around 2030.
Current investment seems to be led by state-run companies in countries such as Qatar, Russia, and Papua New Guinea. Do you see any moves toward capital investment by private companies in the United States or elsewhere?	We will refrain from commenting on status or prospects of individual projects, but in the case of North America, for example, we see economic potential in the fact that natural gas can be used, which is inexpensive compared to current LNG prices.
Assuming that higher LNG prices are temporary, don't you expect capital investment in LNG plants to stop if prices continue to drop?	Higher LNG prices can be attributed not only to tight supply and demand but also to a growing recognition of its value as a fuel in the energy transition, rather than its traditional assessment as one fuel among many. In this sense, any drop in prices is unlikely to reduce capital investment in LNG immediately.
Recent years have seen fewer investments for facilities producing more than 10 million tons, which cost several hundred billion yen. The overall scale of investment is apparently shrinking. Do you view this as the trend from now on?	Projects may involve new construction or expansion, and they may reflect regional characteristics where the construction occurs. The scale of investment varies depending on these kinds of factors, so we do not necessarily see a trend toward investment on a smaller scale.
Have there been any changes in clients' stances on FLNG or future demand outlooks, considering that FLNG is less cost-effective than onshore LNG, and accounting for recent surges in LNG prices?	Although FLNG projects may certainly be described as more expensive, and few have been completed to date, more customers are taking a second look at FLNG, whether because onshore plant construction would be difficult in some cases or because a need is beginning to emerge for offshore development for small or midsize gas fields. Many FLNG projects in existence today have been completed with JGC participation, and we intend to remain active in this business.
What kinds of FLNG projects in particular are currently underway? Has there been an increase in these projects, including feasibility studies?	Currently, the JGC Group is providing FEED services to Petronas in Malaysia, and in Nigeria, we are conducting a feasibility study for an FLNG plant planned by UTM Offshore and the Nigerian National Petroleum Corporation.

<p>Plant construction costs appear to be rising due to higher material cost and labor shortages. Can you tell us the standard construction cost per ton?</p>	<p>It is difficult to generalize about plant costs, which depend on the construction site and a variety of construction conditions.</p>
<p>How much extra revenue can be expected, as greater environmental compliance leads to CCS and other facilities being added to regular construction costs, increasing the amount of orders?</p>	<p>This is too difficult to specify, because CCS construction costs vary depending on factors such as the amount of CO<sub>2</sub> recovered and injected, the gas wells or geological formations, and the injection conditions.</p>
<p>Do you foresee a trend toward mandatory CCS measures in clients' upstream development?</p>	<p>Natural gas and LNG investment is among the activities that must be environmentally conscious, due to European CO<sub>2</sub> emission regulations and the like. As before, we will actively support clients in executing environmentally sound projects.</p>
<p>What kind of business model is envisioned for CCS? Beyond EPC business, to what extent are new schemes introducing things such as stock-based business models under consideration?</p>	<p>Here, we believe the principal business will remain EPC for CCS facilities. Additionally, as with the feasibility study for the CCS demonstration project for the Gundih gas field in Indonesia, we are also looking to participate in designing systems and creating mechanisms to enable trading of captured and stored CO<sub>2</sub> as emission credits using the Joint Crediting Mechanism (JCM).</p>
<p>With the prospect of ammonia-powered marine engines becoming commercially available around 2025, ammonia demand is expected to increase in marine fuel applications. In marine fuels, does JGC view LNG as the main scenario?</p>	<p>Figures on page 10 of the presentation materials represent a general viewpoint as published by the Ministry of Land, Infrastructure, Transport and Tourism. These do not necessarily represent the views of JGC.</p>

## 2. Status of Sustainability-Oriented Business Development

Question	Answer
<p>In each area, what is your impression of the scale of business and pace of progress?</p>	<p>In gasification chemical recycling of plastic waste, although we had received several inquiries as of last year's briefing, the pandemic has made progress somewhat slower than expected last year.</p> <p>We believe SAF business will be established soonest, with plant construction planned in order to start Japan's first domestic supply of SAF in 2025 in response to growing calls in society.</p> <p>Regarding ammonia, demonstration of green ammonia operations on a semi-commercial scale by around 2024 is targeted, and we expect sales of ammonia as a chemical for applications such as denitrification at coal-fired power plants.</p> <p>As for the scale of sales, our 2030 targets are 50 billion yen in business supporting the circular economy and 50 billion yen from blue hydrogen and fuel ammonia.</p>
<p>We had believed that the company's advantage in green ammonia production lies in being able to produce ammonia at low temperatures and under low pressure using a proprietary catalyst, but does the presentation today suggest an advantage in integrated control systems to control fluctuations in electricity from renewables and optimize operation?</p>	<p>We are currently focusing on development and construction of integrated control systems, including weather forecasting, for complete optimization of all aspects—from highly variable power generation from renewable energy to hydrogen and ammonia production using water electrolysis. As for our original catalyst, we have encountered a bottleneck in that surging prices for catalyst raw materials make this approach less economically compelling. We will be studying this issue, including the need to develop a more economical catalyst.</p>
<p>Regarding SAF, higher demand is expected to increase the price of used cooking oil, which is the raw material. Can a competitive advantage be maintained, relative to other SAF raw materials? Please</p>	<p>Although used cooking oil is undoubtedly a finite resource, we consider it important to position the 500,000 kiloliters of this oil currently available in Japan as a domestic resource akin to urban oil</p>

<p>also share your thoughts on the limited availability of raw materials and your impression of current assumed SAF production costs.</p>	<p>fields and somehow tap it for a domestic supply of SAF. To this end, we have asked relevant government ministries and agencies to take advantage of it.</p> <p>As for how economically compelling this solution is, high-volume production overseas (as for bioethanol) is admittedly far less expensive. However, benefits include enabling use of a domestic resource, clearing the skies over Japan, and generating less CO<sub>2</sub> emissions on an LCA basis than other SAFs. For these reasons, we would also like to seek the support and understanding of average consumers through various activities and streamline collection of used cooking oil to cut costs. Moreover, because some collected oil is currently exported for other purposes, keeping this resource in Japan for use as a raw material for SAF can help control costs. JGC business partner Revo International has already secured collection routes and continues to purchase the oil at consistent prices, so we believe sharp rises in the price of this oil can be avoided.</p>
<p>Do you envision other business besides SAF production based on used cooking oil?</p>	<p>We intend to expand the scope of this business by applying an engineering company's insight on a variety of process technologies. Besides the second and third phases of SAF business based on used cooking oil, we will be studying production of fuel using woody biomass from forest thinning.</p>
<p>Please tell us if there have been any updates on demonstration testing of CO<sub>2</sub> separation and recovery using DDR-type zeolite membranes.</p>	<p>Although a demonstration test in the U.S. scheduled for last year was postponed due to the pandemic, we expect this work to resume before the end of 2022.</p>