



# Qilak LNG

## Frequently Asked Questions (FAQs)

### Company Information

1. Who is Qilak LNG?

Qilak LNG is a subsidiary of Lloyds Energy, an LNG portfolio developer headquartered in Dubai. Qilak LNG has been formed with the support of seasoned executive and former Alaska Lt. Governor Mead Treadwell, former BP Executive David Clarke, both Alaskans, and Stephen Payne, a Houston, Texas-based LNG industry expert. Qilak's goal is to develop LNG direct export opportunities in North American Arctic regions beginning with the North Slope of Alaska and the Mackenzie Delta in the Northwest Territories of Canada.

The name Qilak, suggested by a North Slope whaler, is an Inupiat word for the environment — land, sea and sky.

2. Who is Lloyds Energy?

Lloyds Energy is a Dubai based LNG developer, established in April 2013, which operates in three distinct business divisions: Near Shore LNG with gas sources on several continents; floating receiving and regasification terminals in Europe and the Indo-Pacific region; and Global Sales and Trading.

3. What are Lloyds' qualifications to develop Arctic LNG?

The team from Lloyds Energy has extensive experience in all aspects of the LNG value chain — from LNG project development and construction to finance and LNG trading. Many of the staff have had long careers with the major O&G companies such as Shell, ExxonMobil, Chevron, BP, Rosneft, and with trading and finance companies such as Gunvor and Deutsche Bank. The Alaska team has been involved in Arctic oil and gas development, previous LNG projects, and have extensive experience supporting Alaska's trade and US security relations in Asia, infrastructure finance, Arctic cooperation and development of safe Arctic shipping.

### Gas Liquefaction

4. What is LNG?

LNG is natural gas that has been cooled to  $-162^{\circ}\text{C}$  or  $-260^{\circ}\text{F}$  to turn it into a liquid form at ambient pressure. This reduces its volume by a factor of 600, allowing it to be much more easily transported.

5. What development concepts are being considered?

Qilak is currently considering three distinct development concepts for a near shore liquefaction plant (NSLNG). The first option is to mount a liquefaction plant on a grounded barge next to an offshore barrier island (similar to the Snohvit LNG project in Norway and the Seawater Treatment Plant at Prudhoe Bay). The second option would build an ice resistant harbor located about 6 miles offshore that accommodates the NSLNG plant and will provide sheltered LNG loading. The third alternative under consideration would bring a large Gravity Based Structure (GBS) to an offshore location that will accommodate liquefaction, storage and offloading (similar to the recently sanctioned Arctic LNG 2 project in Russia). The final concept may well be a hybrid of these 3 basic concepts that takes the best features from each. The location for each of these options would be chosen after extensive review of ice conditions, wildlife habitat, and consultation with North Slope residents, including subsistence hunters.

6. What is NSLNG?

Near Shore LNG is a gas liquefaction facility that is built under controlled conditions in a shipyard and floated to a location offshore that has sufficiently deep water to allow loading of deep draft LNG carriers. This is not a new concept: Arco did an extensive study of the concept for Prudhoe Bay 35 years ago back in 1984. LNG carrier technology was not as advanced then as it is today, and the ice conditions were much more challenging three decades ago compared to today. [NOTE: Additional discussion of sea ice conditions not necessary to define NSLNG.]

7. What advantages does NSLNG have over the AKLNG concept?

The main advantage of NSLNG is that it does not require a very expensive 800-mile pipeline to an ice-free port. Another advantage is that the whole facility that comprises gas liquefaction, storage and offloading can be built in a shipyard under very controlled conditions which minimizes the risk of cost overruns.

8. What LNG capacity does the project have?

The project will have a minimum capacity of 4 MTPA. Gas that is available from the Point Thomson owners and from other fields in the area could allow capacity to be increased up to 8 MTPA. Once the concept is proven as feasible and economic, there is an opportunity to use an identical concept offshore Prudhoe Bay and offshore the Mackenzie Delta. Lloyds Energy's philosophy is "design one, build many."

9. Are there any similar projects?

In many ways this project will be very similar to the first Yamal project in Russia in that it will use the same type of ice breaking LNG carriers. The main difference is that Qilak will have a much shorter distance through ice to get to the lower Bering Sea and North Pacific Ocean (~600 versus ~2600 nm). The second Russian project Arctic LNG 2, also being developed by Novatek, will use very large gravity-based structures located near shore to support the gas liquefaction plants. While Russian Arctic gas has beaten Alaska North Slope gas to

the market so far, sailing right past Alaska, an Alaska direct-export project Qilak proposes has the opportunity to learn from Russia's experience on what works and what doesn't.

10. Where will the LNG facilities and LNG carriers be built?

It is most likely both the LNG facilities and carriers will be built in Asian shipyards (S. Korea, China or Japan) which have experience with similar projects and where costs are very competitive.

11. When is 1<sup>st</sup> production?

The first step is for Qilak to complete Feasibility studies which will be kicked off at the end of 2019. This will be followed by pre-FEED and FEED, achieving a Final Investment Decision (FID) targeted for 2021. Construction is expected to take 42 to 48 months achieving startup in 2025 or early 2026.

**Social**

12. Will the project supply gas to Alaskans?

The Qilak project team is investigating ways that LNG may be delivered to communities, perhaps in ISO containers, along the west coast of Alaska, or brought ashore by barge to Prudhoe Bay and trucked south. The increasing need of marine vessels for LNG bunkering fuel has caused many ports worldwide ports to take on LNG receiving and storage capability to replace diesel and heavy fuel oil in powering ships. That trend many expand demand for and availability of LNG throughout Alaska. LPGs (propane and butane) may also be available for delivery by truck directly from the North Slope.

13. How many jobs will be generated for Alaskans?

The Qilak Project will generate construction and operating jobs directly and indirectly. Off-shore, construction could be expected to provide 200 or more Alaska jobs in building subsea pipelines and installing the NSLNG facilities. Operationally, approximately 200 new Alaska jobs will be created either in the North Slope region or Southcentral Alaska. Indirectly, many workers will be required for construction of the Point Thomson gas handling expansion project and the gas treatment facilities which will most likely be onshore.

14. How will the project benefit Alaskans?

The project will benefit Alaskans in multiple ways. Firstly, the State of Alaska will be able to sell its share of royalty gas, at least 70 million feet per day, which could net the Treasury and the Permanent Fund an estimated \$25-50 million per year. Secondly, the project will allow the condensate production from the Point Thomson field to be increased 5-fold which will bring additional royalty income from an additional 6,000 barrels of royalty condensate daily — perhaps \$100 million per year estimated receipts after transport costs. The overall development onshore and offshore will produce additional corporate and ad valorem tax revenue to benefit both the State and the North Slope Borough.

## Shipping

### 15. Will the project be able to export LNG year-round?

Qilak plans to export LNG year-round using ice breaking LNG carriers. These are very specialized vessels that are dual acting in that they have an ice breaking stern and go backwards when in ice, and a conventional bow, so they turn around when they get to open water. The Russians have built 15 of these vessels in Korea for their Yamal project in northern Russia and will be ordering as many again for their recently announced Arctic LNG 2 project.

### 16. How often will LNG carriers transit the route?

With an LNG production rate of 4 MTPA, LNG carriers each with a capacity of 172,600 m<sup>3</sup> would be expected to load a cargo every 6.5 days. At higher LNG production rates the cargo frequency will increase accordingly.

### 17. How many ice breaking LNG carriers will be required?

The number of vessels required will depend on three factors: firstly, the LNG production rate, secondly, the distance to the market – Tokyo at 3350 nm will need less vessels than a more distant port say Manila in the Philippines at ~5000 nm. Thirdly, for longer transit distances Qilak will consider the option of transshipment, where the cargo is transferred into non ice-class LNG carriers which are not needed for the ice-free portion of the journey and are less expensive.

Potential transshipment locations have not yet been identified, but Russia has announced plans for a transshipment site at Petropavlovsk in Kamchatka. A location in the US, e.g. Port Clarence or Dutch Harbor would be optimal, but may not be allowed to receive gas from non-Jones Act compliant vessels. It is likely that this project will require between 4 and 10 new icebreaking carriers.

### 18. Will the LNG carriers need heavy duty ice breaker support?

Operating experience from the Yamal's icebreaking LNG tankers has exceeded expectations and they have successfully broken through deep ice ridges unassisted. The most severe ice conditions along the route from the North Slope are expected to be off Point Barrow where two sea currents collide causing ice ridges to build up. Qilak has taken a conservative approach and assumed that a commercial heavy-duty ice breaker, such as one of the vessels built in the US for Shell's offshore exploration program, will be on location to assist the vessels transit Pt Barrow, if required.

### 19. Will the USGC new Polar Security Cutters be available to assist the LNG carriers?

This is an excellent question. The USGC has under order the 1<sup>st</sup> of six new \$675 million-dollar heavy-duty ice breaking polar security cutters which will replace the 40+ year old Polar Star and Polar Sea. The 1<sup>st</sup> of the new cutters is scheduled for delivery in 2024 with the 2<sup>nd</sup> and 3<sup>rd</sup> cutters in 2025 and 2026.

Under the USCG charter, the USCG is mandated to assist commercial shipping, however, to date there has not been a need to test this mandate. The Alaska Delegation and Maine's Senator King has introduced the Shipping and Environmental Arctic Leadership (SEAL) Act which is sometimes called "Uber for Icebreakers". It would create a development corporation that would set up a system for contracting with the USCG and private US fleets and working with foreign icebreakers. The idea is similar to that established for the St Lawrence Seaway. This act would establish an Arctic seaway development corporation that would help provide more icebreaking capability in the Arctic Ocean.

20. What are the pollution risks from LNG transport?

The pollution risks are very small. LNG carriers are dual fuel and are primarily powered by the gas that boils off (BOG) from the LNG in the storage tanks. They have a small amount of diesel for back up, but no heavy oil. The LNG cargo will vaporize in the event of a spill and have no impact on the sea.

21. Is transporting LNG dangerous?

LNG has been safely transported around the world by ship and truck for more than 50 years with an outstanding safety record. Over 300 million tons of LNG was delivered worldwide last year. Highly regulated safety systems are mandated by maritime law and insurers. LNG itself is actually safer to handle than many other fuels. It has no color or odor and is non-toxic. In its liquid state, it is not flammable. Liquid LNG is not explosive; when released as vapor, it dissipates in the air, and cannot explode as readily as propane vapor can. While the vapor is flammable, it requires high heat - about 1000°C to ignite, compared to 550°C for propane and 300°C for diesel. Even when it does burn, it produces what is known as a "lazy flame," burning more like a candle than an explosive gasoline flame.

### **Ecological and Environment**

22. How will the project be permitted and how long will it take?

Parts of the project will require permits from the North Slope Borough, several state and federal agencies. An Environmental Impact Statement will be written for the project by a federal lead agency with participation by state and local governments, tribal governments, and the public. As the project proceeds to complete its proposed siting and optimized configuration, an EIS schedule will be announced. Depending on location and gas sources, FERC, MARAD, and BOEM all have had oversight roles for LNG projects.

23. Why not leave the gas in the ground to avoid global warming?

The markets that Qilak are exploring in Asia are largely interested in switching from coal to gas for heating and power generation. Natural gas reduces the carbon footprint by 50% compared to coal. It is also much cleaner allowing Asian countries to reduce particulate pollution and clean up their air. New technologies in development are also allowing carbon capture and sequestration at the point of gas consumption. As Alaska's LNG is quite close to Asian markets, the carbon footprint of shipping will be reduced from distance efficiencies.

24. What about Subsistence Activities?

Qilak will work closely with the North Slope Borough, the Marine Mammal Commission, and marine mammal co-management groups to ensure that the Qilak LNG 1 development is done in an environmentally sensitive and safe manner that also minimizes disruption to marine mammals and subsistence activities. Qilak will select an offshore location for the gas liquefaction facilities and also plot the shipping routes of the LNG carriers to avoid interference with subsistence activities. It is likely that the LNG carriers, after they load up, will travel north away from Pt Thomson before turning West keeping them well away from the Northern coast of Alaska. Ship tracks and speeds will be carefully chosen to avoid interference with seasonal migration and hunting in the Bering Straits.

25. Are there any areas that will be avoided along the shipping route?

There are currently no restricted areas along the route from the North Slope to Asia that we know of. However, Qilak will fully comply with any future restrictions that may be designated, for example, the IMO may designate “Particularly Sensitive Sea Areas”(PSSA), which place limits on vessel traffic; and the USCG may identify Areas to be Avoided (ATBAs) in order to reduce ship strikes with marine wildlife.

**Markets**

26. Where are the LNG markets?

Qilak is looking exclusively at Asian markets where the company can be very competitive on shipping costs. Qilak’s parent company Lloyds Energy has recently signed an agreement with PNOOC to supply gas to a 1200MW power project in the Philippines and is working on several other offtake arrangements in Korea, China, Vietnam and Japan.

27. What is the projected future demand for LNG?

Natural gas is seen as a bridge fuel from oil and coal and is significantly more environmentally friendly in terms of greenhouse gases and particulate matter emissions. World gas demand has doubled in the last 30 years and is projected to increase at 4 to 5% a year until 2030. Asian markets will be the main engine for demand growth. Investment in new LNG projects will be required to meet this demand after 2020.

**Finance and Costs**

28. How does the development cost compare to AKLNG?

The development costs are estimated at about 2/3 of the cost of AKLNG project. The savings are primarily due to not having to build a long-distance pipeline. It is less than 10 miles to get to the near shore location for the gas liquefaction plant offshore Pt Thomson compared to 800 miles for the AKLNG pipeline to Kenai. The costs for gas treatment and the gas liquefaction are expected to be similar for the 2 projects. We are estimating a development cost in

the range of \$1200-1400/t compared to the quoted cost of \$2150/t for AKLNG. We expect to build the liquefaction plant in a shipyard where it is possible to get a fixed price; as a result the costs are likely to be much more predictable than for a long-distance pipeline, with reduced chance of a major cost overrun.

29. Can Alaskans invest in the Project?

Qilak LNG will be structured so that major investors can take a stake in the project. In addition, there may be the opportunity for Alaskan companies and native corporations to own and operate parts of the infrastructure, e.g. if Qilak decides to build a deep-water port.

30. How will the project be financed?

Qilak is in discussions with infrastructure investors, sovereign lenders (including Japan's Bank for International Cooperation) and construction and engineering firms conglomerates that are keen to get involved in the project at an early stage to fund it through the Final Investment Decision (FID). Once FID is achieved, Qilak expects global infrastructure capital to provide funding for construction. Qilak does not anticipate and is not requesting any State of Alaska funding.

31. Alaska has had many attempts to commercialize North Slope gas. Why should Alaskans believe that this time it will be different?

Past and present efforts to monetize Alaskan gas over four decades have all required a very long-distance pipeline to gas markets in the Lower 48 or to an LNG plant in an ice-free port location. Furthermore, very large quantities of offtake were necessary to cover high capital costs. High cost mega projects are not competitive with projects lucky enough to be close to markets. Qilak's project can begin with just 4-8 million metric tons of annual offtake — much less than other projects have required. Furthermore, shipping costs and distances from Alaska's North Slope are competitive with other sources of gas headed to the same markets from the Western Russian Arctic, the Middle East, Australia and the Gulf of Mexico via Panama's canal.

32. When is the optimum time to export gas from the North Slope?

All the major fields on the North Slope are currently recycling the gas that is produced with the liquid hydrocarbons. The recycled gas keeps the pressure in the reservoir high and allows more liquids to be produced. When fields reach a certain level of maturity there comes a point where the gas is as, or more valuable, than the remaining liquids and it makes more sense to sell it rather than use it for fuel to recycle gas. We expect ExxonMobil to work with the Alaska Oil & Gas Conservation Commission (AOGCC) to maintain the necessary authorizations for gas sales.

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