

# LNG plant construction a huge undertaking

By Larry Persily [lpersily@kpb.us](mailto:lpersily@kpb.us)

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*(This update, provided by the Kenai Peninsula Borough mayor's office, is part of an ongoing effort to help keep the public informed about the Alaska LNG project.)*

Alaska LNG project teams played it by the numbers — really big numbers — in a presentation on construction plans to federal, state and municipal officials:

- Site preparations for the proposed liquefied natural gas plant and massive LNG storage tanks in Nikiski would require stripping up to 4 million cubic yards of loose soil, soft peat moss and other vegetation. That's more than enough to cover a rough trail 10 feet wide, a foot deep from New York City to Houston.
- Crews would then need to excavate as much as 6 million cubic yards of frost-susceptible material — up to 6 feet deep in some areas — to prepare the site for construction. Some of the material could be reused as fill, while other material would need to be trucked in to complete the base.
- The two domed LNG storage tanks would each measure 305 feet in diameter, more than large enough for a Boeing 747 to spin around inside without scraping its wings.

All of the numbers are approximate and subject to change as the project teams refine the design, they reminded participants at workshops held Sept. 2 and 3 in Anchorage. More than 20 Alaska LNG project team members were at the workshops to brief government agency officials and answer questions.

Add in the jetty, the twin loading berths for LNG carriers, and other offshore and onshore components of the Nikiski project, and the preliminary numbers continue adding up:

- The project would use 800,000 cubic yards of gravel, 300,000 cubic yards of concrete, 300,000 cubic yards of armor rock, 100,000 tons of structural steel, 6,500 pilings, 7 miles of electrical wiring, almost 200 miles of aboveground piping, and 20 miles of buried pipe.
- The trestle to reach the loading berths could be as much as 3,200 feet long — more than half a mile — to reach water deep enough for the LNG carriers to safely maneuver.
- Though no substantial dredging would be needed for the jetty and loading berths, an estimated 1 million to 2 million cubic yards of dredging would be required at the temporary dock that would be built for offloading materials from barges and heavy-lift vessels during construction.
- The 250-megawatt, gas-fired power plant at the site would generate enough electricity to run a city of several tens of thousands of homes.
- Peak construction workforce at the Nikiski site would be 4,000 to 6,000 workers.

## **PLANNING WORK CONTINUES**

The LNG team reported that ongoing engineering and construction planning includes several goals: Limit truck traffic in the area as much as possible, limit dredging as much as possible, and maintain public access throughout the area as much as possible.

The informational workshops were part of a series provided by Alaska LNG for regulatory agencies. The project partners — ExxonMobil, BP, ConocoPhillips, TransCanada and the state of Alaska — plan to submit their second draft of environmental and engineering reports to the Federal Energy Regulatory Commission in first-quarter 2016. The final reports and complete project application could come third-quarter 2016 as the partners work through regulatory and permit issues for the \$45 billion to \$65 billion project to move Alaska North Slope gas to market.

In addition to the LNG plant at Nikiski, the project includes 806 miles of pipeline to reach the plant site from North Slope gas fields and a gas treatment plant to remove carbon dioxide and other impurities before the gas enters the pipeline.

Alaska LNG has been buying up property around the proposed plant site in Nikiski, accumulating ownership or options on about 600 acres of the 800 to 900 acres needed for the operation. Team members reported that demolition could start later this month on some structures. They also are doubling their security patrols in the area in response to community concerns.

The actual footprint for the LNG plant, storage tanks, power plant and other support buildings would total approximately 200 to 300 acres. The teams explained that the rest of the land is to provide a safety, noise and light buffer for neighboring property owners, plus work space to support the construction effort.

If the partners give the go-ahead to start construction after completing their regulatory work, commercial negotiations and financing, the mobilization, fabrication of modules, site work and construction would take several years, with the first LNG production coming in the seventh year after a final investment decision to proceed, the teams explained. If the project proceeds under the current schedule, the first LNG carriers would load up in 2025.

## **OFFLOADING FACILITY COMES FIRST**

There is a lot of work to get to that first cargo.

Before significant construction could begin, the material offloading facility would need to be built. The current plan, subject to change, has it just north of the LNG carrier jetty. With a 1,500-foot-wide frontage for offloading from heavy-lift vessels (called lift-on, lift-off) and a side facility with a 500-foot face for roll-on, roll-off deliveries, the freight dock could see 250 LNG

plant modules delivered by 60 ships over a three-year period. Riprap — heavy rocks stacked atop each other — would be installed on either side of the facility to protect the shoreline.

Each prebuilt module could weigh as much as 6,000 tons. Self-propelled modular trailers would haul the huge pieces to the plant site.

The freight dock would be dismantled at the end of the project.

Water depth at the proposed site for the offloading facility is only about 15 feet and would need to be dredged to 30 feet, the teams said. Estimates are that would require moving 1 million to 2 million cubic yards from the seabed. “We are continuing to study how we can minimize that,” a team leader said. The dredged area would measure about 3,200 feet by 1,500 feet, depending on the final design and seabed slope.

The project continues to collect data on currents, waves, sediment, sea floor bathymetry and other conditions in the area. There are plans to excavate a sample pit in the seabed in the second quarter 2016 to measure how much and how quickly it fills in.

Disposal sites for any dredging material are still being considered, including upland and at sea. Upland disposal could be used to protect the shoreline from erosion or for fill at the project site. Any decisions on disposal sites will be based on the composition of the dredged spoils and in close consultation with government agencies.

In an effort to limit truck traffic on heavily traveled Kenai Peninsula highways, the teams reported that as much as possible construction materials arriving in Anchorage or Seward would be barged to Nikiski.

## **CONSTRUCTION SITE SERVICES**

Even before the material offloading facility is under full construction, Alaska LNG would build “pioneer camps” at the plant site, the first housing for the first work crews. During construction, until the project builds its own power generating plant, Alaska LNG may buy electricity from a local provider — that’s one of the issues still undecided.

Currently, Alaska LNG plans to drill its own water wells, estimating its maximum needs during peak construction at almost 400,000 gallons a day, or enough for 4,000 to 5,000 people, according to U.S. government water-use estimates.

Current plans indicate no water would be withdrawn from Cook Inlet for plant operations, the teams said. The liquefaction equipment will be air-cooled, not water-cooled.

Alaska LNG plans to build a secondary-level treatment plant on site for domestic sewage, and is still looking at options for proper disposal of industrial waste.

The mission statement for handling construction waste is “reduce, reuse and recycle,” with the teams reporting there could be an estimated 7,500 tons of wood waste in addition to the 4 million cubic yards of vegetation from site clearing. The teams are working to determine “what can be handled locally, what can be handled on site, what has to be hauled away.”

## **JETTY DESIGN CONTINUES**

The jetty stretching out to the loading berths would be built in an area suffering from coastal erosion. The teams gathered geotechnical data this summer and plan to include “positive erosion control” in the project design, such as rock armor. “It needs engineering attention,” they said.

By going out 3,200 feet with the jetty, the project can avoid dredging at the loading berths. The 15 to 20 LNG carriers that would call at Nikiski each month could range up to 1,100 feet long, with a width of 165 feet and a 39-foot draft. Because sea ice moves through the area, Alaska LNG has ice experts looking at building “ice mitigation structures” — large concrete caissons — in the water that would break up the ice as it flows by. The teams are still evaluating the options and running models on ice build-up and currents.

A service vessel facility may be built off to the side of the loading jetty to accommodate the four tugs the project anticipates would be needed for docking the LNG carriers, along with other smaller service vessels.

## **AIR QUALITY, SAFETY CONSIDERATIONS**

On land, the project continues gathering data on air quality levels, noting that the LNG plant will need to stay within emissions limits for the industrial area that already includes a refinery (Tesoro), a fertilizer manufacturing plant (Agrium, which is considering reopening the closed plant), and a small LNG plant (ConocoPhillips) that has operated since 1969.

The LNG plant will require safety flares for pressure release or other emergency use. The teams reported the current plan is to avoid a single tall flare tower, and instead install a ground flare system behind 30-foot-high barriers to help block the noise and light.

The liquefaction process itself “is a giant refrigeration system,” a team leader explained, “not much different from an air conditioner.” In addition to supercooling the methane down to minus 260 degrees Fahrenheit to reduce it to a liquid 1/600<sup>th</sup> the volume of its gaseous state, the plant will remove any remaining water in the gas stream that made it through the North Slope treatment plant.

The LNG plant will take down the water to 0.1 parts per million. Water in the gas stream turns into ice in the liquefaction equipment — not a good thing.

## **PRUDOE BAY DOCK EXPANSION**

Though Nikiski-area residents are certainly focused on their end of the project, similar dredging, dock and delivery planning is underway at the north end of the project — at Prudhoe Bay.

The current plan is to expand what is called West Dock No. 2 at Prudhoe Bay to accommodate the larger production modules that would be delivered there for the gas treatment plant, along with other construction materials. The heaviest of those modules could weigh 9,000 tons and measure 300 feet by 90 feet.

The searift could take four years, delivering a total of 300,000 tons of modules and equipment.

Dredging would be required to accommodate the delivery barges, looking to clear a 14,000-foot-long channel, 280 feet wide at a 16-foot depth to reach the dock, with an 800-foot by 1,000-foot turning basin at the front of the dock, Alaska LNG teams explained. Dredging volume could total 2 million to 2.5 million cubic yards.

Dredging could be done in the winter by cutting, excavating and removing sea ice and then staging excavators on the ice to reach out and dredge below.

Alaska LNG continues sedimentation and seabed studies in the area.

In addition to dredging, work would include expanding West Dock No. 2 an additional 14 acres, adding three berths to the two already at the dock, and widening the road and causeway between the dockhead and land. Plans also could include an onshore staging area of 20 to 60 acres to move equipment to clear the dock as fast as possible.