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Q&A: Liquefied Natural Gas: A Potential Terrorist Target?

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What is Liquefied Natural Gas (LNG)?

When natural gas is cooled to -260˚F, it condenses into a liquid. In this liquid state, natural gas can be shipped and stored in large quantities via refrigerated tankers before being converted back into gas and distributed through pipelines. In the absence of a pipeline, the only way natural gas can be shipped is in this liquid form. Such shipments are likely to increase: According to the Energy Information Administration, global natural gas consumption is expected to increase 70 percent from 2002 to 2025. Over the same time frame, natural-gas consumption in China is expected to more than quintuple. Today nearly a quarter of U.S. energy comes from natural gas, and within twenty years it could be responsible for as much as a third of American energy consumption. The percentage of liquefied gas imports to the United States is expected to rise sharply in that period.

Is LNG safe?

Natural gas is at least 90 percent methane, which is highly combustible. Though in its liquid state, natural gas is not explosive, spilled LNG will quickly evaporate, forming a highly combustible vapor cloud, which if ignited, can be very dangerous, says James Fay, professor emeritus at the Massachusetts Institute of Technology [MIT]. Describing one scenario, he says that a hole in an LNG tanker could result in liquid leaking out of the storage vessel faster than it would burn off, resulting in an expanding "pool fire." A 2004 study by the Sandia National Laboratory, a division of the Department of Energy, suggests that such a fire would be hot enough to melt steel at distances of 1,200 feet, and could result in second-degree burns on exposed skin a mile away. "This would be bigger than any industrial fire with which we have experience," Fay says. "There's no way to put out that kind of fire." A pool fire will burn until all its fuel is gone, which takes five to eight minutes, but it could ignite a rash of secondary fires on such a large scale that they may cause more damage than the initial blaze.

The only notable LNG accident in the United States occurred in 1944 in Cleveland, Ohio, when a full storage tank burst. The LNG spilled out, quickly evaporated, and ignited, scorching some thirty acres of land and killing 128 people and leaving 225 injured. Since this incident, cold-storage technology has made significant advances, and experts say the likelihood of such an incident repeating itself is remote. In 2004, a boiler at an LNG-production plant in Skikda, Algeria exploded, resulting in a gas leak and a larger secondary explosion and a fire that left two dozen people dead.

Are LNG ships and terminals potential terrorist targets?

Yes, because of LNG's raw explosive power, experts say. Al-Qaeda, for example, has specifically cited LNG as a desirable target, says Rob Knake, senior associate at Good Harbor Consulting, LLC, a homeland-security private consulting firm. Pipelines are not as attractive because the flow of gas can quickly be cut off and an explosion easily contained. Terminals make better targets because an attack could result in a massive fire that could potentially kill scores of people. They are also good targets because "if you take out those terminals, you could have a significant disruption [in the U.S. gas supply,]" Knake says. Nevertheless, the most attractive targets are the boats: 1,000-foot

tankers with double hulls and specially constructed storage tanks that keep the LNG cold. A report, put out by Good Harbor Consulting assessing the risk of a proposed LNG terminal in Providence, Rhode Island, concluded that a successful terrorist attack on a tanker could result in as many as 8,000 deaths and upwards of 20,000 injuries.

The Sandia National Laboratories report assesses four potential ways terrorists may target an LNG tanker:

Ramming: Terrorists may attempt to drive another vessel into an LNG tanker or to divert a tanker into a stationary object. Unless the tanker is struck at a very high speed or the object striking it is very sharp, it is unlikely that a breach of the hull will occur. However, if such a breach did occur, there is a chance LNG would spill out and cause a massive fire.
Triggered Explosion: Explosives, such as mines, may be placed in the path of an LNG tanker or on the tanker itself. If powerful enough, such an explosion could cause the cargo to spill and ignite.
External Attack: There are several ways terrorists may attempt to assault an LNG tanker. The 2000 U.S.S. Cole attack, in which terrorists detonated explosives after pulling alongside the warship in a small vessel, is often cited as an example of such an attack. Other possible methods of attack include firing missiles or rocket-propelled grenades at a tanker and or air strikes. Tankers are particularly vulnerable as they traverse inland waterways en route to their destinations. The impact of an assault would vary depending on the size and location of the attack, the worst-case scenario being a massive explosion.
Hijacking: The most catastrophic scenario involving an LNG tanker involves terrorists taking control of an LNG tanker, sailing it toward a major population area and detonating the cargo.

What safety precautions are taken to prevent such attacks?

LNG tankers approaching U.S. waters must provide ninety-six hours' notice, allowing the Coast Guard to provide a small flotilla to safely escort the boat to its destination. Added security detail includes local police boats, divers, firefighting tugboats, and a helicopter. Bridges along the tanker's route are closed and nearby airports suspend flights. Any private vessels that drift too close are sternly turned away. Tankers are inspected and screened for explosives before they are allowed to approach land, and tanker crews must pass a security check before being allowed to board the vessels. At LNG terminals, there is also a heavy security presence; access to the terminals is controlled, and security personnel perform regular threat-response drills.

Because of its low cost and high impact, a U.S.S. Cole-style attack remains an important security concern for defense planners. "It's not a difficult thing to do if you're determined to do it," Fay says. "It doesn't require trained experts to evade the Coast Guard." When a passenger jet enters restricted airspace over a nuclear plant, it is the U.S. president, Knake says, who must decide whether to repel the plane with force. Yet when a private craft drifts too close to an LNG tanker, "you could have a petty officer in the Coast Guard making this call," he says.

What are the security implications of the rising demand for LNG?

Simply put, more LNG means more targets, which require more security. As the number of incoming LNG tankers continues to rise, experts question whether the Coast Guard can continue the intimidating display of force it currently provides for all incoming shipments. Rising demand and economies of scale are likely to put larger quantities of LNG in a single place. Fay expects the size of LNG tankers to double in the coming years, which could make an attack even more catastrophic.

Where do LNG shipments arrive in the United States?

There are currently only five LNG terminals in the United States. Four of these are onshore terminals, located in Everett, Massachusetts; Cove Point, Maryland; Elba Island, Georgia; and Lake Charles, Louisiana. A fifth, offshore terminal is the Gulf Gateway Energy Bridge in the Gulf of Mexico. The Elba Island and Everett terminals are near the population centers of Savannah and Boston, respectively.

These five terminals hardly have the capacity to handle the projected increase in LNG imports, experts say. Thus, there are nearly forty proposals to build new LNG terminals along the coastline of the United States. Most of the proposed terminals are along the Gulf coast, with the remainder located in the Northeast and Southern California.

Many of the proposed land-based terminals are encountering local opposition over security concerns, and the Federal Energy Regulatory Commission (FERC) expects that as few as a dozen of the proposed terminals will actually be built.

Proximity to market is a major factor in determining the location of new LNG terminals, meaning that many of the proposed terminals would be near large population centers. On-land proposals are reviewed by the FERC with almost no oversight from the Department of Homeland Security. Knake says in terms of security, "we lack any strategic sense of how we should be placing these terminals." Proposals for offshore LNG terminals are reviewed by the Coast Guard, and are generally considered less of a security risk. "Landing LNG tankers far off shore removes the possibility of attacks on the populations," Fay explains.

Where does most natural gas come from?

In 2004, Russia, which holds the world's largest reserves, accounted for nearly 29 percent of world exports. Canada, which accounts for 15 percent of global exports, sends the bulk of its natural gas to the United States via pipelines, which pose less of a security risk than tankers. Forty-five percent of the world's natural gas reserves are found in the Persian Gulf, with Iran, Qatar, Saudi Arabia, and the United Arab Emirates holding the most gas. Of these nations, Qatar, which has a bilateral defense treaty with the United States and enjoys friendly relations with the West, is ramping up its production in an attempt to become a major supplier of natural gas in the years to come.