

# Liquefied Natural Gas Facilities

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Walter Sonne, P.E.

Moffatt & Nichol



# LNG Receiving Terminals

Function:

- Receive LNG from LNGC's
- Store LNG in Tanks
- Regasify LNG and send out the gas via pipeline for distribution

# What is LNG?

LNG is natural gas cooled to  $-256^{\circ}$  F at which point the gas becomes a liquid

LNG has a density that is 600 times greater than natural gas

LNG is very pure – about 95% methane

LNG is economically and safely transported by ship – over 33,000 voyages in 45 years without breach of containment

# What LNG is NOT

Explosive at atmospheric pressure

Flammable as a liquid

Toxic

Transported or stored under pressure

# Existing LNG Terminals

Tractebel – Everett, Mass

Dominion – Cove Point, Maryland

Southern – Elba Island, Georgia

Trunkline – Lake Charles, Louisiana

Eco Electrica - Penuelas, Puerto Rico

Gulf Gateway – Offshore Louisiana

ConocoPhillips – Kenai, Alaska (liquefaction)

# Trunkline LNG – Lake Charles



# Eco Electrica LNG – Puerto Rico



# **Terminals Under Construction**

Freeport, Texas (ConocoPhillips)

Sabine Pass, Louisiana (Cheniere)



# Construction Pending

Cameron, Louisiana (Sempra)

Sabine, Texas (ExxonMobil)

Ingelside, Texas (Occidental)

Ingelside, Texas (Cheniere)

# Approved by FERC

Ingelside, Texas (ExxonMobil)

Fall River, Massachusetts (Weaver's Cove)

Expansion at Elba Island, Georgia (Southern)

Expansion at Lake Charles, Louisiana  
(Trunkline)

# Other Terminals

14 others proposed in the U.S.

8 proposed for offshore U.S.

4 proposed in Canada

2 proposed in the Bahamas

2 under construction in Mexico

3 proposed in Mexico

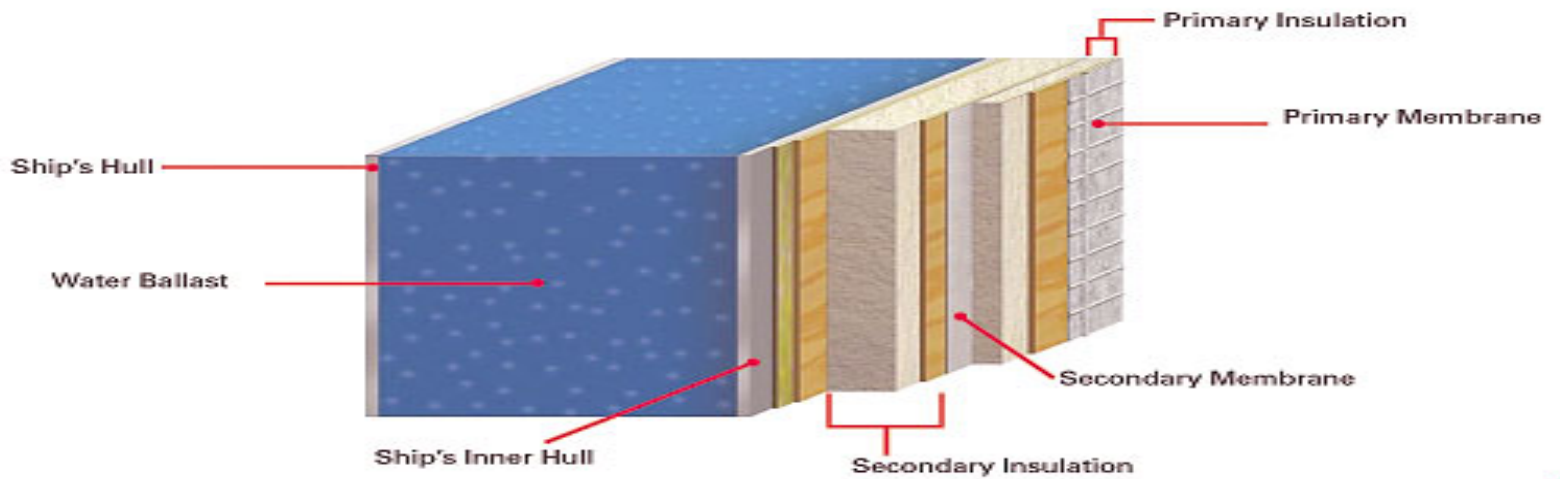
# LNG Carrier



# LNG Carrier



**A Cross-Section of the LNG Ship's Hull and Containment System –  
In Total More Than Six Feet in Width.**



# Current LNG Carriers

About 180 carriers afloat

Maximum Capacity - 145,000 cubic meters

Length – between 260 and 299 meters (850 to 980 feet)

Beam – 42 to 45 meters (138 to 148 feet)

Loaded Draft – 10.5 to 11.8 meters (37.7 to 38.7 feet)

# Carriers on Order

About 110

Maximum Capacity - 215,000 cubic meters

Maximum Length – 315 meters (1033 feet)

Beam – 50 meters (165 feet)

Loaded Draft – 12 meters (39.4 feet)

# Planned Carriers

Maximum Capacity - 265,000 cubic meters

Maximum Length – 350 meters (1150 feet)

Beam – 55 meters (180 feet)

Loaded Draft – 13 meters (42.5 feet)



# Siting Criteria

Channel Depth – allow 10% underkeel

Channel Width – up to 5 times the beam (not always possible)

Turning Basin – twice the LOA of vessel (min)

Air draft – 135 feet (min)

# LNG Vessel Traffic

LNG Vessels at berth less than 24 hours

Security measures implemented by Coast  
Guard

Typically has little effect on other traffic

# LNG Vessel Traffic

Planned Terminals are between 0.75 and 2.6 billion standard cubic feet per day

- At 0.75 bscfd – one vessel every 4 days
- At 1.0 bscfd – one vessel every 3 days
- At 2.0 bscfd – one vessel every 1.5 days
- At 2.6 bscfd – one vessel every 1 day

# LNG Safety and Security



# LNG Safety and Security

## U.S. Coast Guard Responsibility

- Vessel Security Plan – NVIC 1002
- Facility Security Plan – NVIC 1102
- Waterway Suitability Assessment - 0505

# LNG Safety and Security

“Exclusion” zones are basically a safety and security zone and varies with each particular location and is usually conditional

The Coast Guard is the "owner" of the exclusion zone requirement while the vessel is in navigable waters and at berth

Each plan is specifically tailored to the needs of the local community and the characteristics of the water body upon which the LNG facility is located and the LNG vessels transit

# LNG Safety and Security

## Existing U.S. Terminals

While underway

- Between 500 yards & 2 miles ahead or astern
- Between the channel width & 500 yards

While at berth – between 50 feet & 400 yards

# LNG Safety and Security

## Existing European Terminals

While underway

- Between 0 and 800 meters ahead or astern
- Typically the channel width

While at berth – between 50 & 200 meters



# Port Authorities

Site location – within port or outside of port limits

For sites not within port, role of the port authority is not clearly defined – stakeholder at a minimum

Waterway Suitability Assessment timing of 90 days is not realistic as detailed in NVIC 05-05.

# Port Authorities

## Supportive of Project

- Strong extensive public outreach and education is critical
- Typically much opposition – Port Authorities need formative, positive messages and opinion pieces in place
- Interface mechanism for Questions and Answers is beneficial

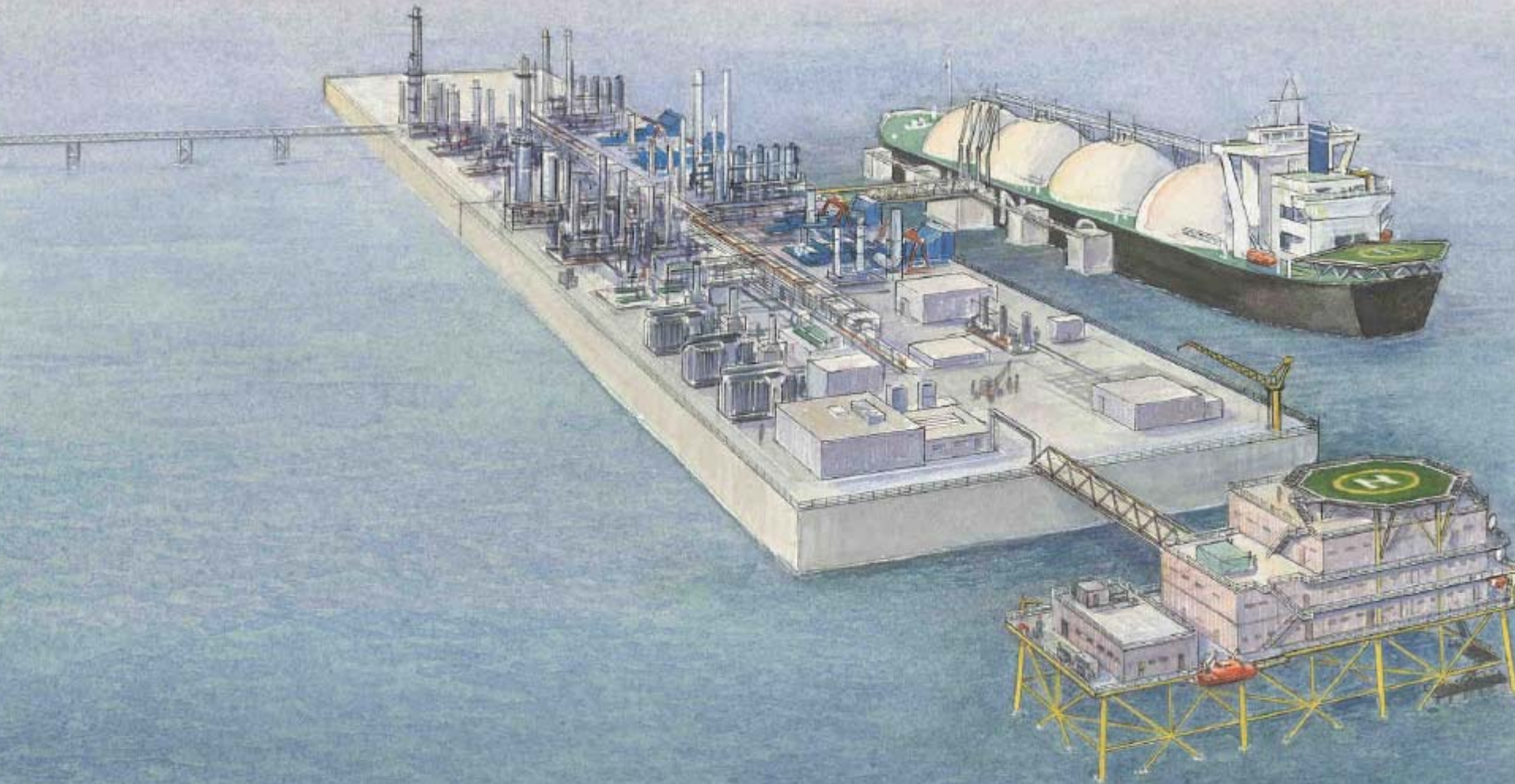
# Crown Landing LNG Terminal



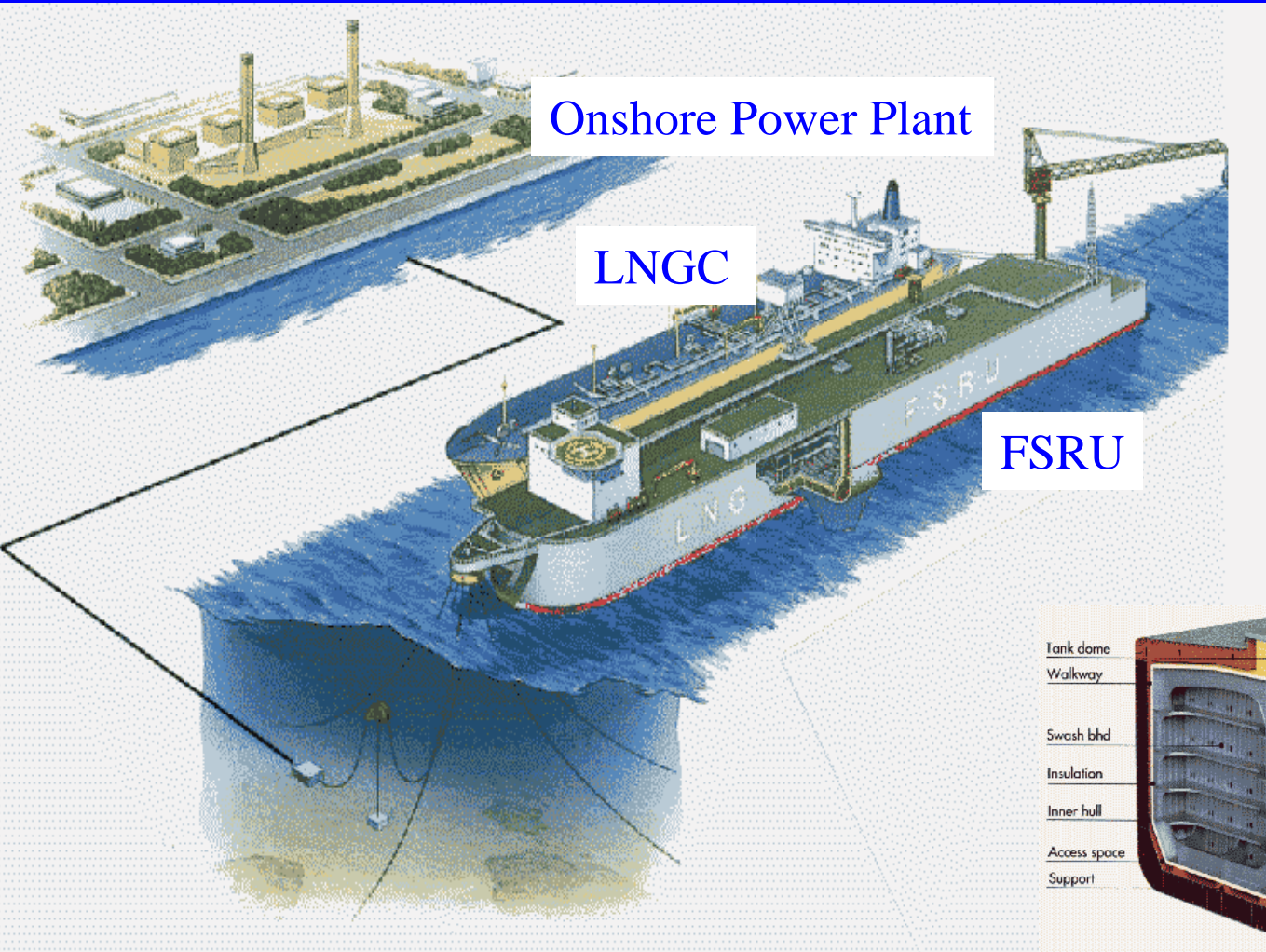
# Casotte Landing LNG Terminal



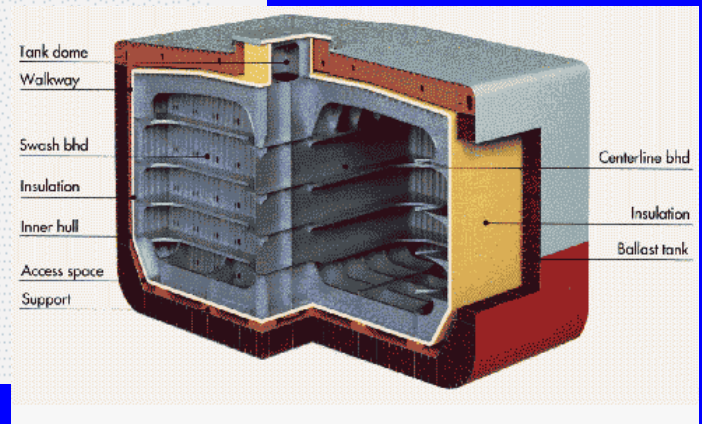
# Gravity Based Structure - GBS



# Floating Storage & Regasification Unit - FSRU -



## Typical Tank



**Thank You**

