Golar LNG Limited

LNG 2002

Houston, February 6-7th, 2002

"The case for developing a Floating LNG Receiving Terminal on the US East Coast"

By

Sveinung J. Stohle, Executive Vice President, Golar LNG Ltd.

Golar LNG Limited

Golar LNG's Strategy

- Be a shipowner that charters out LNG tonnage for various periods to the market in general.

- Be an LNG trader that buys LNG FOB from various sources either alone or with a partner, and sells gas to LNG customers all over the world. As part of the trading activity, Golar will consider investing in other parts of the LNG chain, like liquefaction or regasification capacity.

- Be an LNG development / construction company that invests in or develops new concepts like floating regas or liquefaction units.

Golar LNG Limited

Why a floating LNG regasification terminal for the US East Coast?

- A) Defined market need for additional regasification capacity
- B) Safety concerns regarding land based facilities, i.e. issues raised regarding operations at Everett and Cove Point after the September 11th incident.
- C) Golar as experienced shipowner is comfortable with floating installations, and have direct experience of similar installations through the Frontline Group of companies.

- Golar press release Nov. 2001:
- "Given the growth in the US gas market, and the difficulties that some companies have encountered in siting new land-based regas facilities in the US, which have only been aggravated by the recent tragic events in the US, we believe that floating regas units addresses all such concerns, since they are movable, and thus can be placed away from other installations and densely populated areas."

Golar LNG Limited

Agenda:

1. **Project overview**
2. Technical concept
3. Regulatory process
4. Market and economics
5. Project schedule and milestones

Golar LNG Limited

Project Overview

- Golar LNG Ltd., have conducted a feasibility study for the conversion of an existing Moss design LNG carrier into an offshore LNG receiving terminal.
- The ship used as basis for the study is one of Golar LNG's existing ships, the "Golar Freeze", but it is important to underline that the scope of the evaluation is to develop a floating regas terminal concept, that can be applied to both exisitng and new build ships.
- The study not only examined the feasibility of converting the ship itself, but also site selection, the regulatory & permitting process, the time needed for implementation, as well as estimated project returns.

Main results of the study:

- **Although further work is required through detailed design and engineering, the conclusion of the study is that the project is both technically and economically attractive, and should therefore be carried further into the next Phase.**

Golar LNG Limited

Project Concept

- To develop an offshore regasification terminal using an existing Moss design LNG carrier as the basis for the study
- The offshore regasification terminal would perform the following functions
  - Receipt of LNG
  - Storage of LNG
  - Vaporisation
  - Send out of gas into Gas Transmission System

- ***Construction Timeline c. 20 months from commencement of conversion design stage until start-up***
- ***This naturally means that as compared to any land based facility, this project will have a very short development period***

Golar LNG Limited

Project Concept

The conversion of the LNG carrier involves:

- Prepare cargo and hull systems for c.20 years service
- Install LNG transfer system from LNG Carriers to Floating Terminal
- Install mooring systems for Terminal and for mooring LNG Carriers to Floating Terminal
- Construct vaporisation equipment and necessary utility systems for regasification and send-out
- Design and construct a gas evacuation system from the terminal to the Gas Transmission system.

- ***Estimated CAPEX for the vessel itself, conversion of vessel, related infrastructure costs, hook-up and commissioning c. US $195M***

Golar LNG Limited

Agenda:

1. **Project overview**
2. **Technical concept**
    1. **Terminal Design**
    2. Site Evaluation
3. Regulatory process
4. Market and economics
5. Project schedule and milestones

Golar LNG Limited

LNG Terminal Design Philosophy

- ✓ Well Proven Technology in all Respects
- ✓ Inherently Safe
- ✓ High Reliability & Redundancy
- ✓ Simple
- ✓ Minimal Equipment Count
- ✓ Modular
- ✓ Easy to Maintain
- ✓ Applicable to existing or New Build vessels

Golar LNG Limited

LNG Terminal - Safety Standards

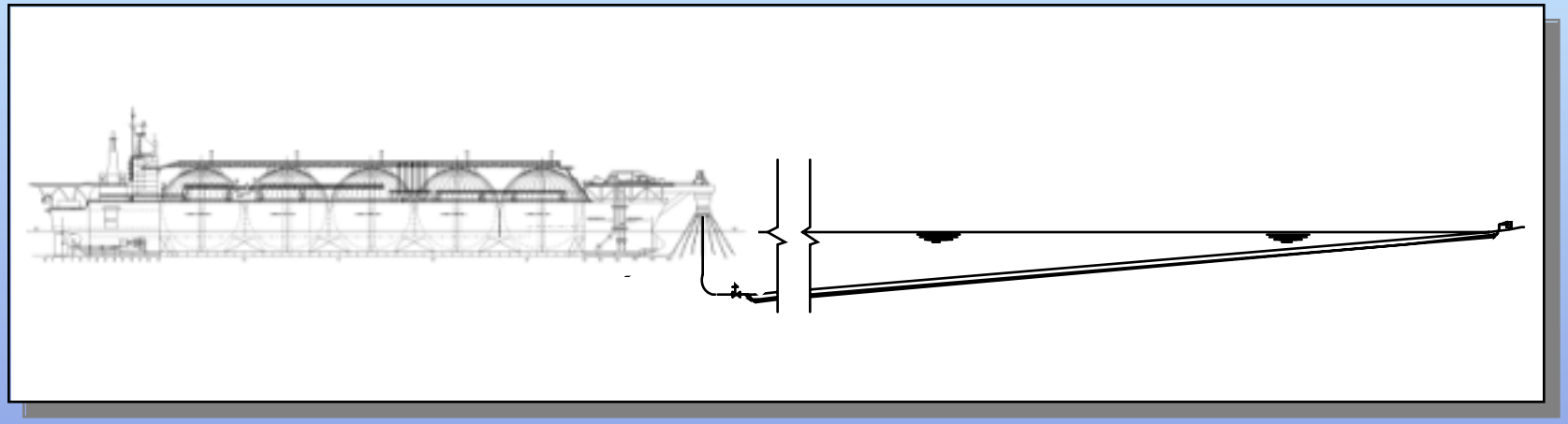
Relevant Safety Standards

- ✓ DNV Rules for Classification of Ships (Liquefied Gas Carriers)
- ✓ IMO Gas Code (IGC 1993)
- ✓ Industry Standards (API, ASME, ISO, etc.)
- ✓ OCIMF - Standardization of Manifolds for LNG
- ✓ SIGGTO - Society of International Gas Tankers & Terminal Operators
- ✓ SOLAS - International Convention for Safety of Life at Sea
- ✓ ICLL - International Convention of Load Lines

The safety standards for the LNG Terminal are derived from relevant industry, shipping, offshore and onshore standards.

Golar LNG Limited

LNG Terminal - Main Particulars



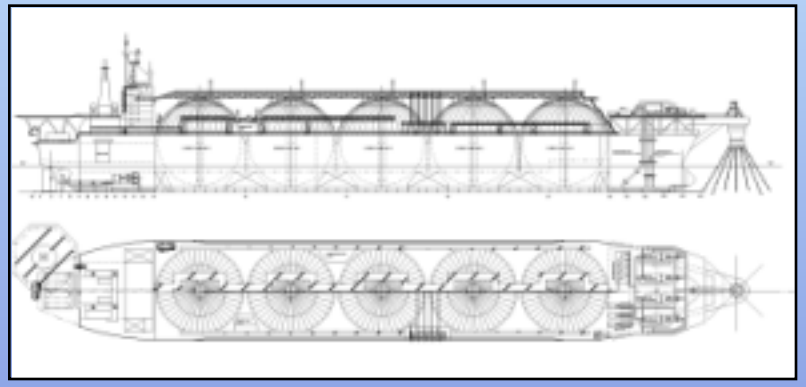
Length Overall (excluding external turret)	:	287.5 m
Length Between Perpendiculars	:	274.0 m
Breadth Moulded	:	42.4 m
Depth to Main Deck Moulded	:	25.0 m
Draught, Design	:	11.5 m
Freeboard abt.	:	12.5 m
Number of LNG Tanks	:	5
Total LNG Storage Volume	:	125,000 m^3
Maximum Gas Sendout Capacity	:	600 t/h (5.2 MMTPA)
Normal Gas Sendout Capacity	:	350 t/h (3.0 MMTPA)
Installed Power Generation Capacity	:	c. 11 MW

Golar LNG Limited

LNG Terminal Overview & Design Specifications

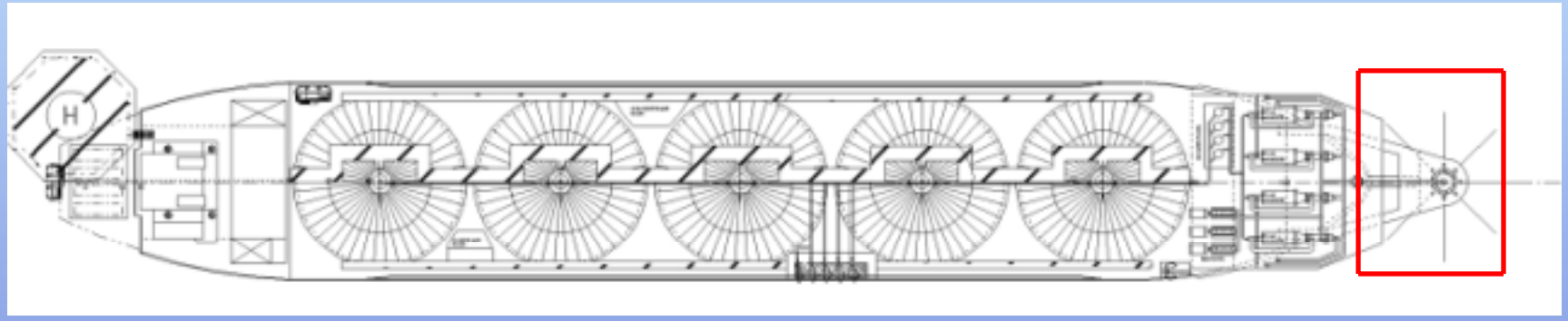
Design Basis

Storage Capacity	:	125,000 m^3
Nominal Regasification Capacity	:	3.0 MMTPA
Maximum Gas Sendout	:	5.2 MMTPA
Availability Per Year	:	350 Days
Water Depth	:	>20 m
Design Life	:	20 Years
Pipeline Pressure	:	80 Barg



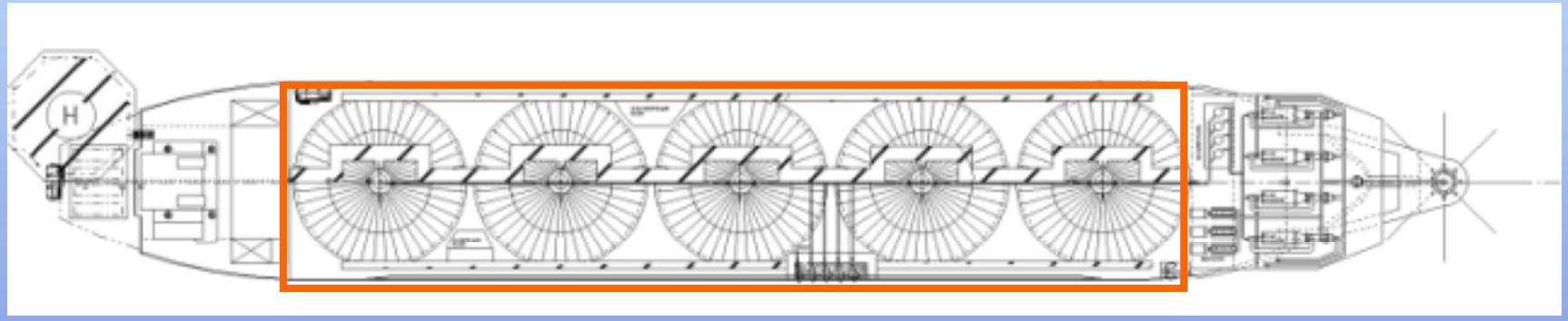
- The LNG Terminal is a steel monohull with 5 Moss type LNG tanks with regasification plant in the forward end.
- The Terminal is moored with an external turret arrangement for free weather-vaning. The gas send-out line is arranged through the mooring system down to the seabed then directly to the shore manifold.
- The LNG tankers will be moored in a side by side configuration for efficient loading.
- Process and utility systems have been designed for simplicity and for ease of operation and maintenance, with simple subsystems and control loops.

LNG Terminal Overview & Design Specifications



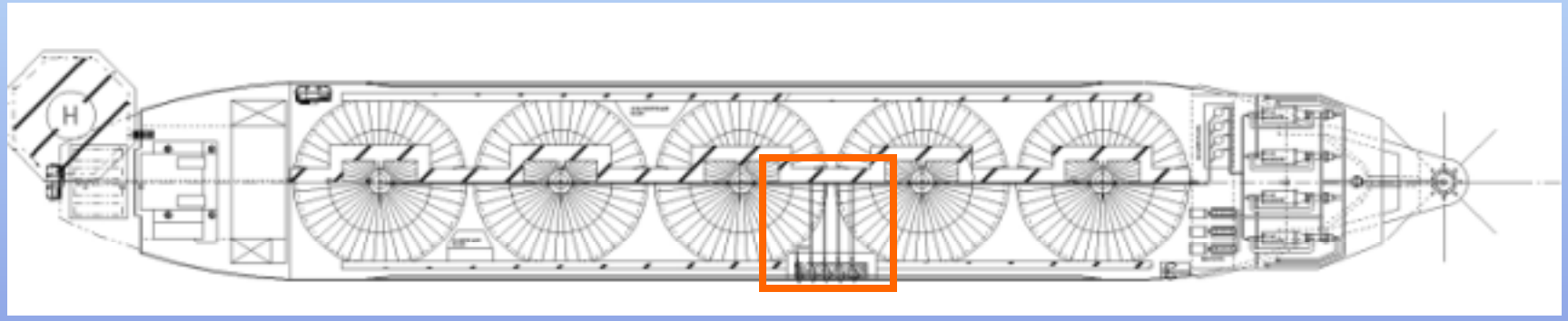
Mooring System

LNG Terminal Overview & Design Specifications



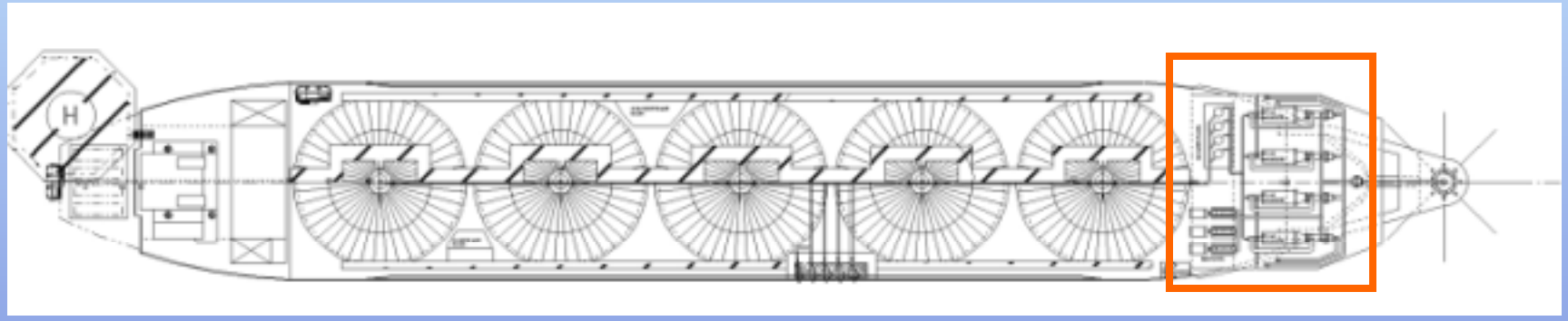
Cargo Containment System

LNG Terminal Overview & Design Specifications



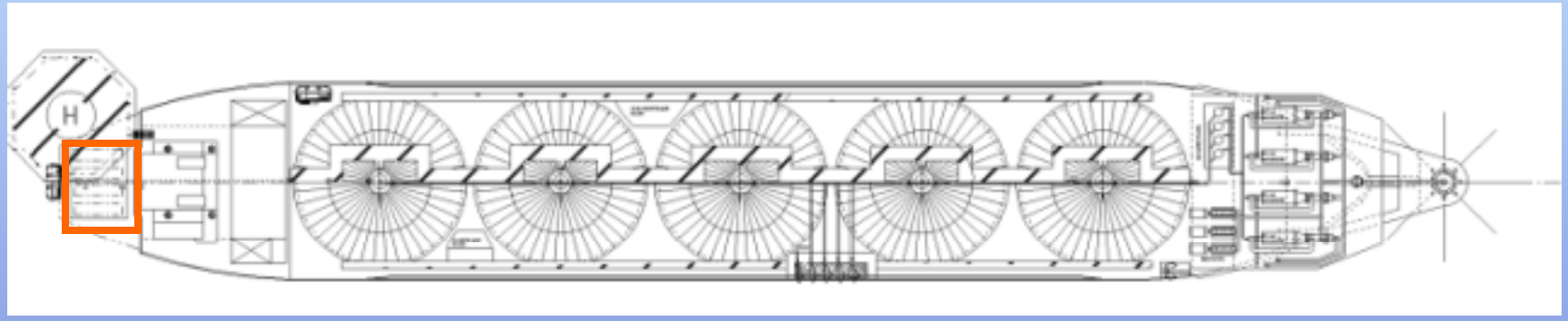
Loading Arms

LNG Terminal Overview & Design Specifications



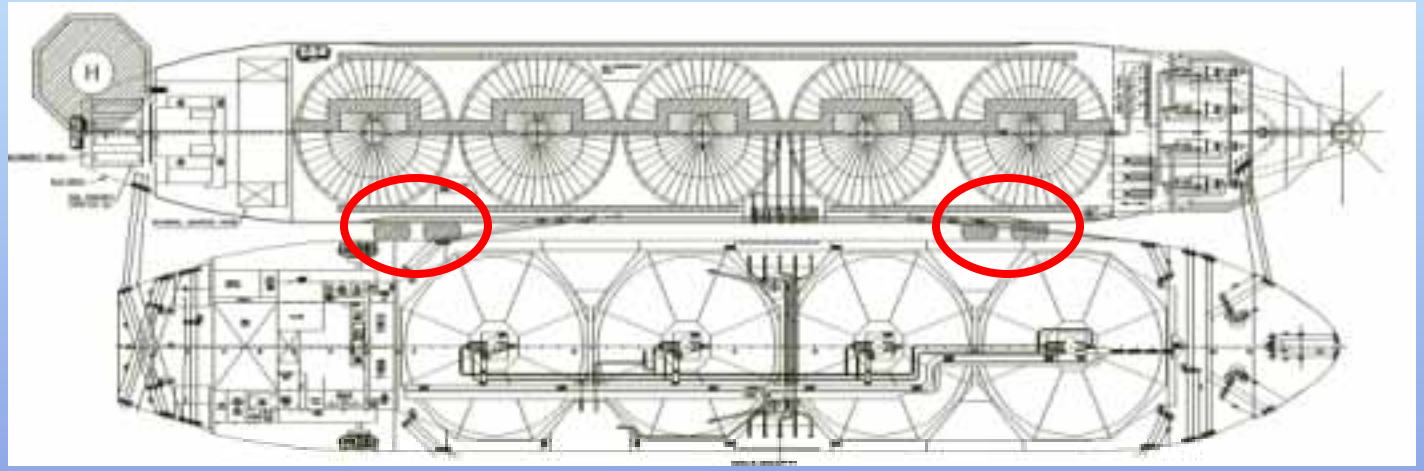
Process Equipment

LNG Terminal Overview & Design Specifications



Power Generation

LNG Terminal Overview & Design Specifications

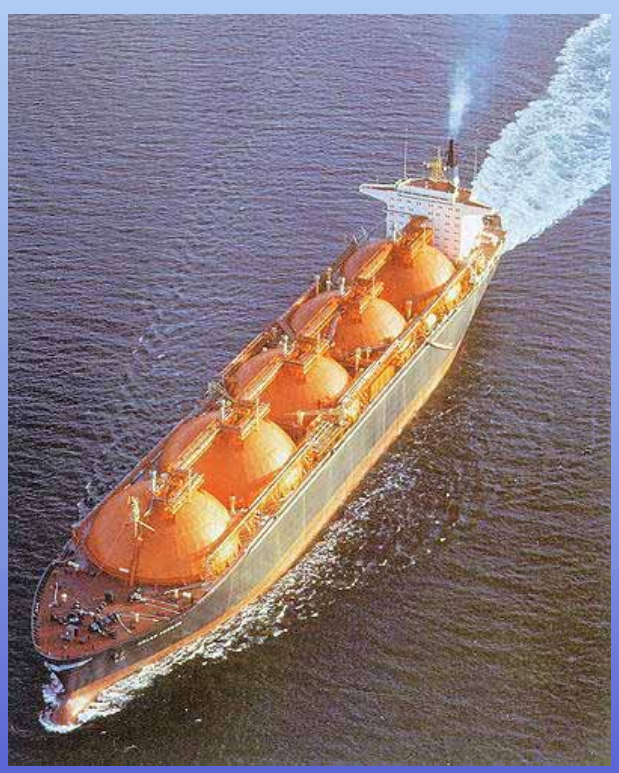


Side by Side Operations

LNG Terminal Overview & Design Specifications

Motion Characteristics

- The roll motion may be minimized through the use of bilge keels and active heading control.



- Precise motion characteristics to be determined in the detailed engineering phase, at which time modification of existing bilge keels is to be addressed for motion dampening.

- A motion analysis of the terminal in operating wave conditions is to be performed during detailed design. Purpose - to define global motions of the terminal, displacements and accelerations of special points of interest.

LNG Terminal Overview & Design Specifications

Safety Systems

- Equipment and pipework throughout the process and storage areas shall be designed with the following in mind:
  - ✓ Leakage & Spillage Prevention
  - ✓ Leakage Detection
  - ✓ Cryogenic Temperature Protection
  - ✓ Gas Leakage & Pipe Rupture Protection
  - ✓ Fire Detection
  - ✓ Fire & Explosion Protection

- Emergency Shut-Down System (ESD) - pneumatically operated and located at strategic positions (tank domes, loading arm area, process area). Release can also be activated from the control room on either ship or LNG Terminal.

- Two Levels of ESD are provided:
  – Entire system shutdown.
  – Triggers the loading arm release valves and mooring line hooks and initiates departure of the LNG carrier.

Golar LNG Limited

Agenda:

1. **Project overview**
2. **Technical concept**
    1. Terminal Design
    2. **Site Evaluation**
3. Regulatory process
4. Market and economics
5. Project schedule and milestones

Golar LNG Limited

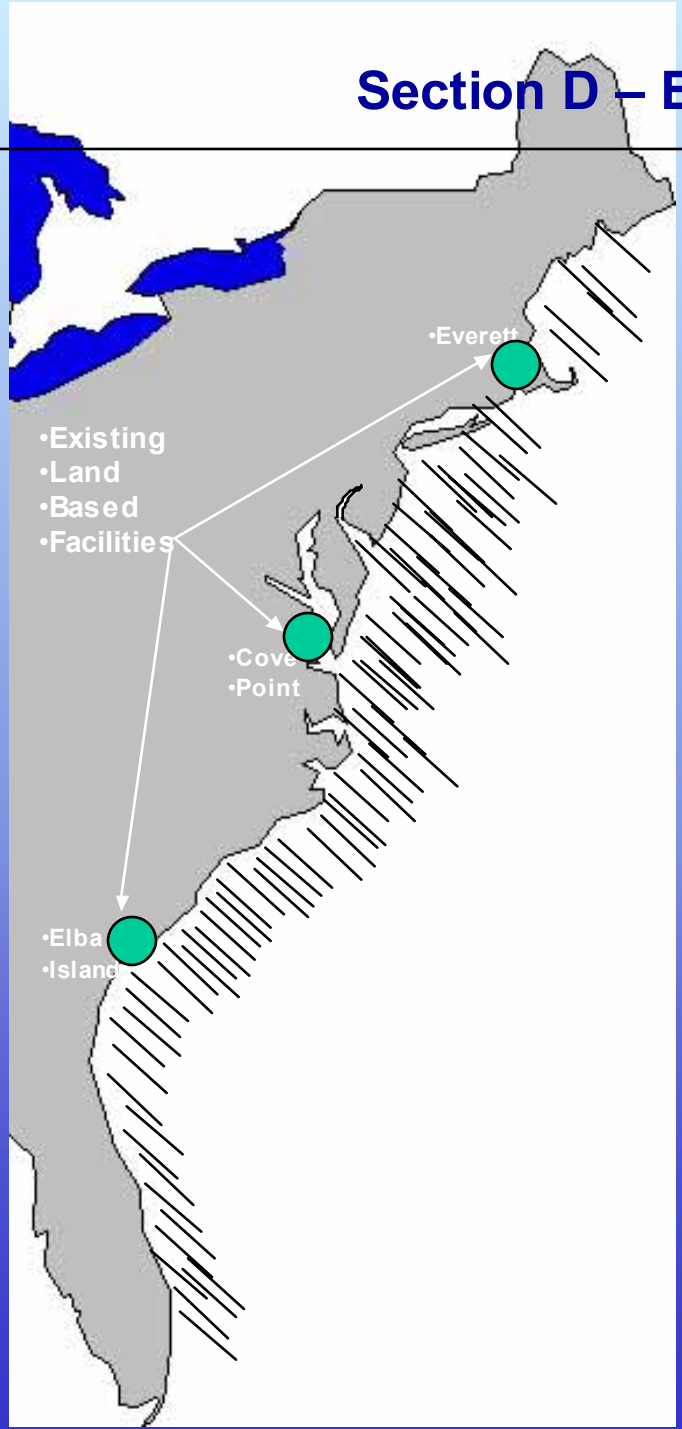
Site Selection Process

Site Comparison Assessment Methodology

- A comparison was conducted for a number of sites using consistent criteria as the comparison basis. This exercise was carried out in order to confirm that no site selection criteria would come within the ”Unacceptable Risk” category. The main comparison criteria were as follows:

1. ***Proximity to Gas Consuming Region***
2. ***Proximity to Existing Gas Transmission Systems***
3. ***Site Safety***
4. ***Site Security***
5. ***Carrier Ingress / Egress***

Section D – East Coast U.S.A.



Sites Considered

A number of sites along the entire East Coast have been considered,

Conclusions

The most attractive location for an offshore LNG terminal has been determined and chosen in light of the following.

- Access to Gas Transmission System and Markets
- No threat to public
- Large planned Power Generation capacity additions
- High Cost Gas region

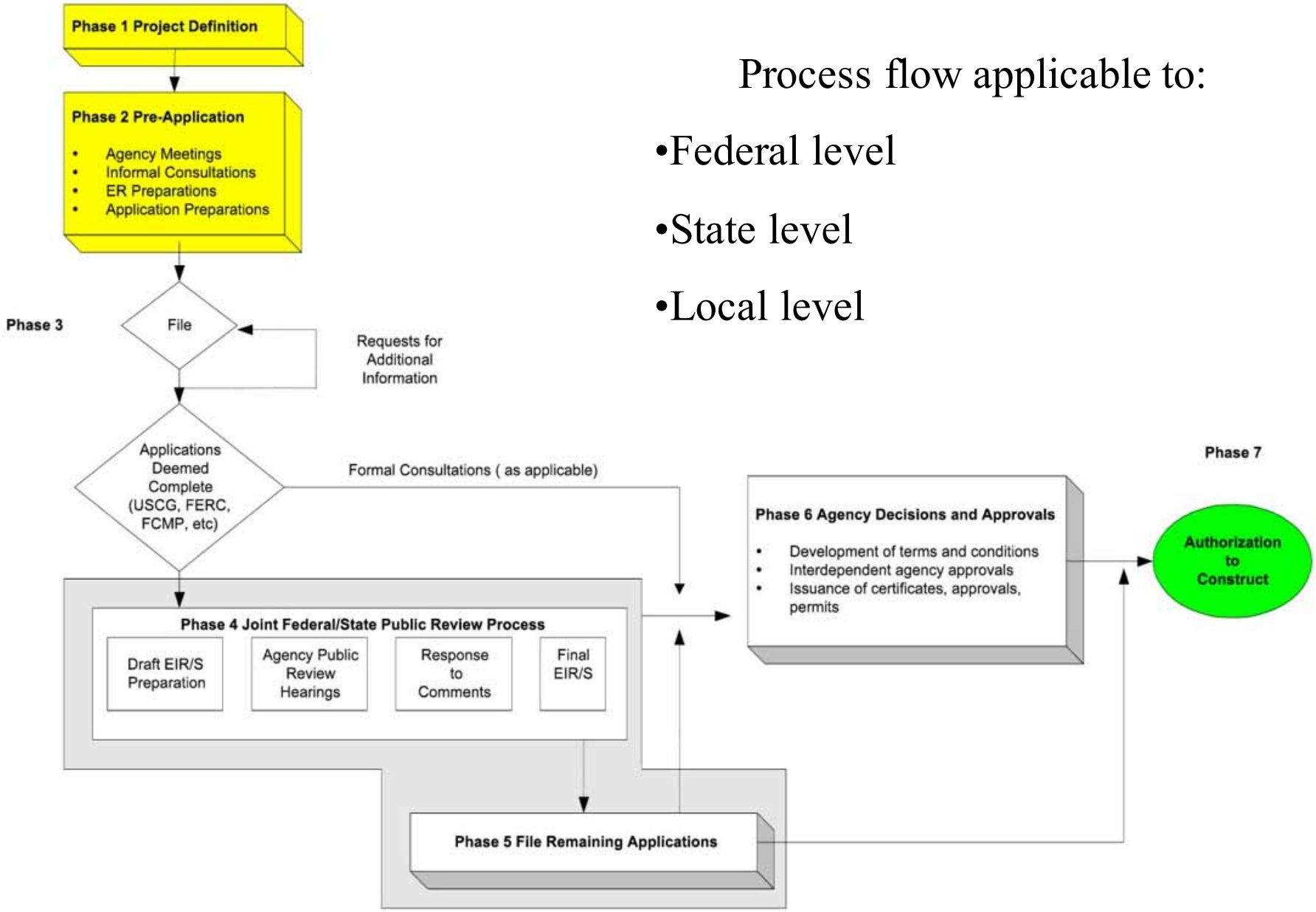
Golar LNG Limited

Agenda:

1. Project overview
2. Technical concept
    1. Terminal Design
    2. Site Evaluation
3. **Regulatory process**
4. Market and economics
5. Project schedule and milestones

Golar LNG Limited

Critical Permitting Phases



Process flow applicable to:

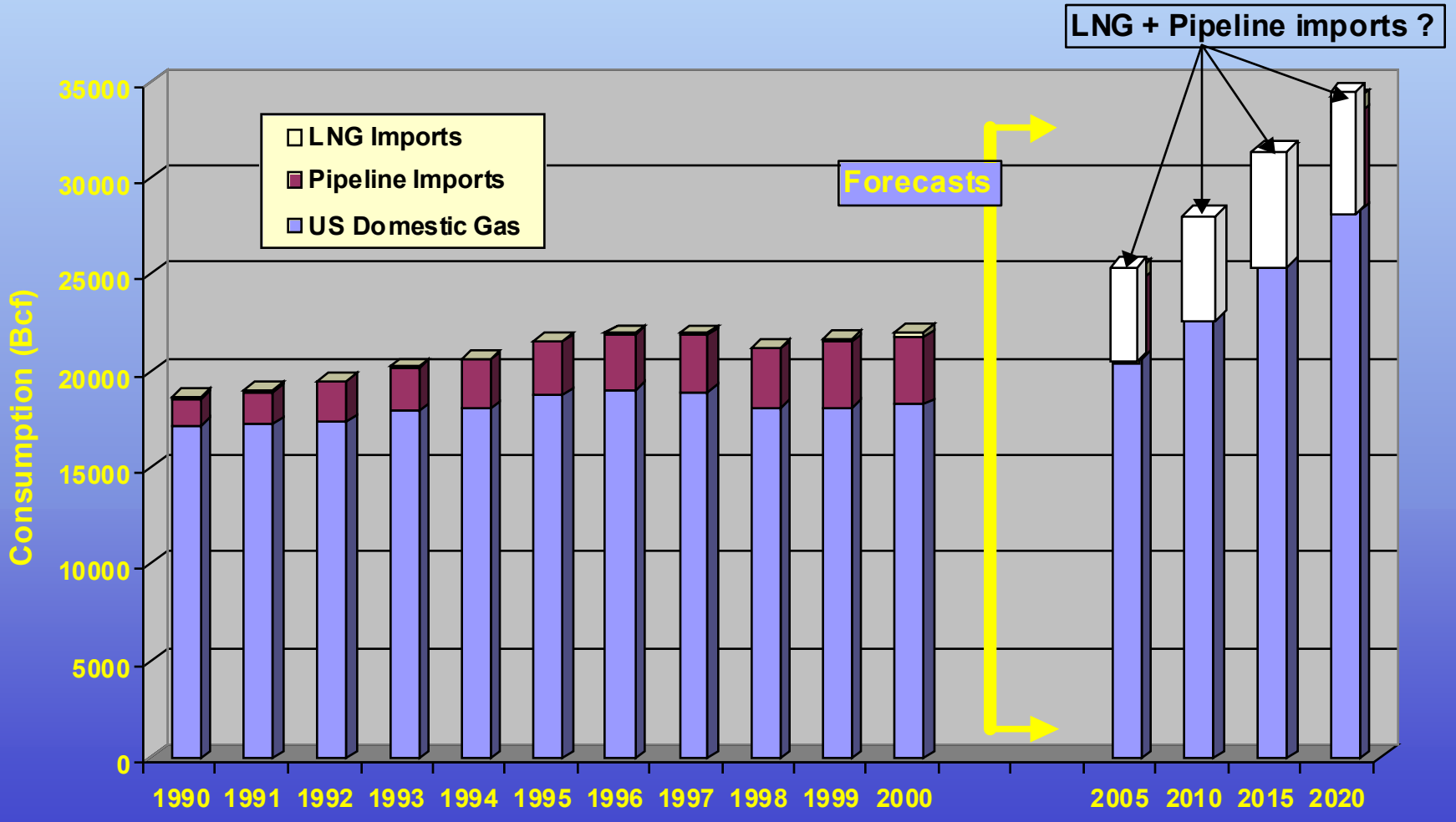
- Federal level
- State level
- Local level

Golar LNG Limited

Agenda:

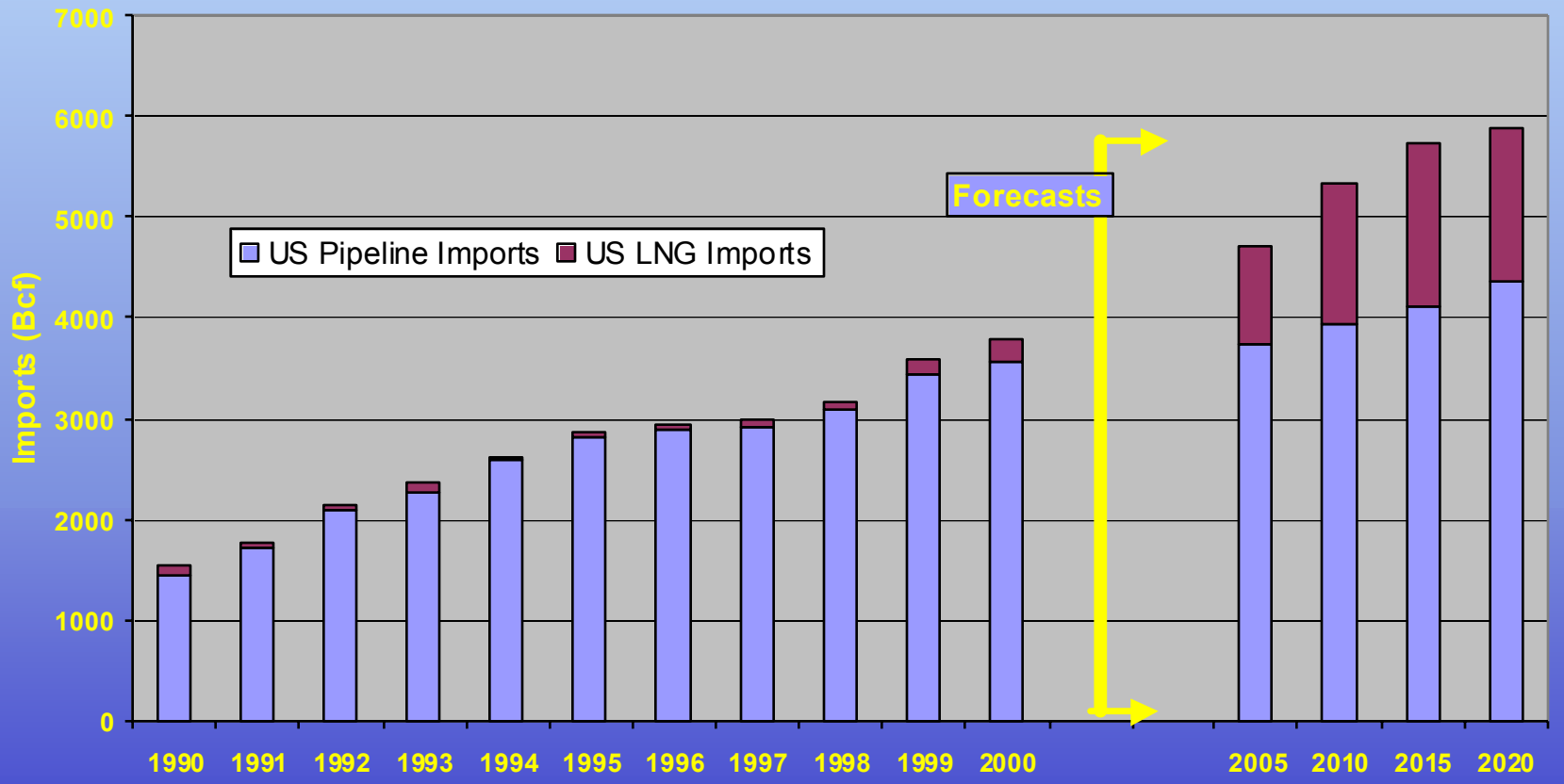
1. Project overview
2. Technical concept
    1. Terminal Design
    2. Site Evaluation
3. Regulatory process
4. **Market and economics**
5. Project schedule and milestones

US Natural Gas Consumption (Historical and Forecast)



Sources: History: Energy Information Administration (EIA), *International Energy Annual 1999*, DOE/EIA-0219(99)

LNG + Pipeline Imports
(Historical and Forecast)



Sources: History: Energy Information Administration (EIA), *International Energy Annual 1999*, DOE/EIA-0219(99)

Golar LNG Limited

Project Economics

		Yr 1 (Q4)	2	3	4	5	6
No. of Cargoes		*6*	*45*	*60*	*62*	*64*	*64*
EBITDA		*5.25*	*34.0*	*49.0*	*51.0*	*53.0*	*53.0*

Golar LNG Limited

Agenda:

1. Project overview
2. Technical concept
    1. Terminal Design
    2. Site Evaluation
3. Regulatory process
4. Market and economics
5. **Project schedule and milestones**

Golar LNG Limited

Strategic Milestones

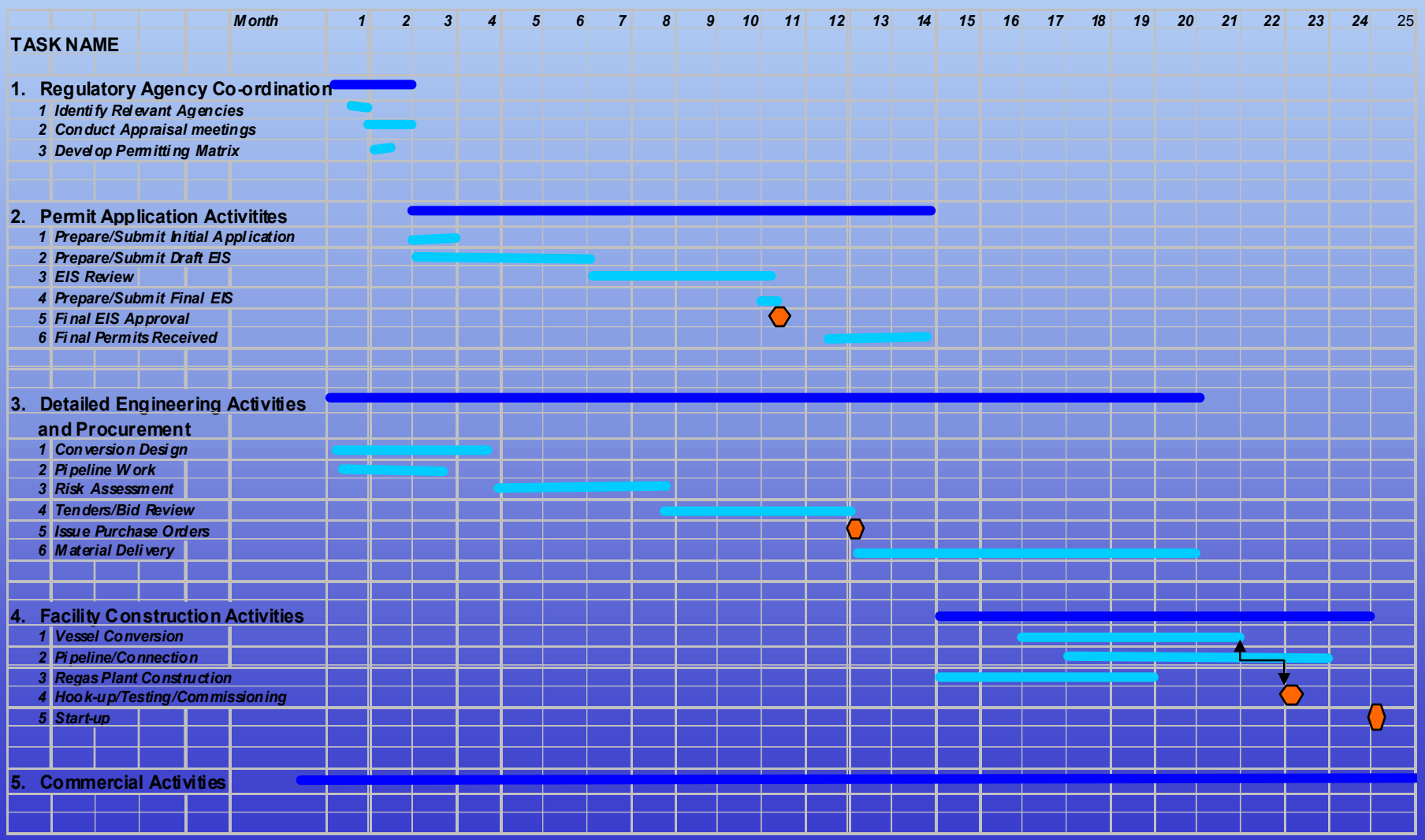
- **Phase 1:**
- January 2002, completed Feasibility study, which shows that the project is attractive and should be carried to the next phase

- **Phase 2: Q1 2002**:
- Identify Project partners and negotiate JVA to set up separate terminal “NewCo”
- Identify potential Customers
- Negotiate Capacity Rights with customers on long-term basis
- Initiate Regulatory Process with relevant Agencies
- Prepare all relevant EIA’s and commence permit application activities
- Initiate detailed Engineering and procurement
- Initiate project financing activities
- Negotiate cost of procuring vessel
- Prepare and issue tender for conversion with yards

- **Phase 3: Q1 2003**
- Vessel conversion and equipment installation

- **Phase 4: Q1 2004**
- Project start-up

Project Master Schedule



Golar LNG Ltd.