INTERNATIONAL ASSOCIATION OF MARITIME UNIVERSITIES

The APEC Gas Forum

Ocean Transportation of LNG:

Toward the Best Framework through Global Collaboration

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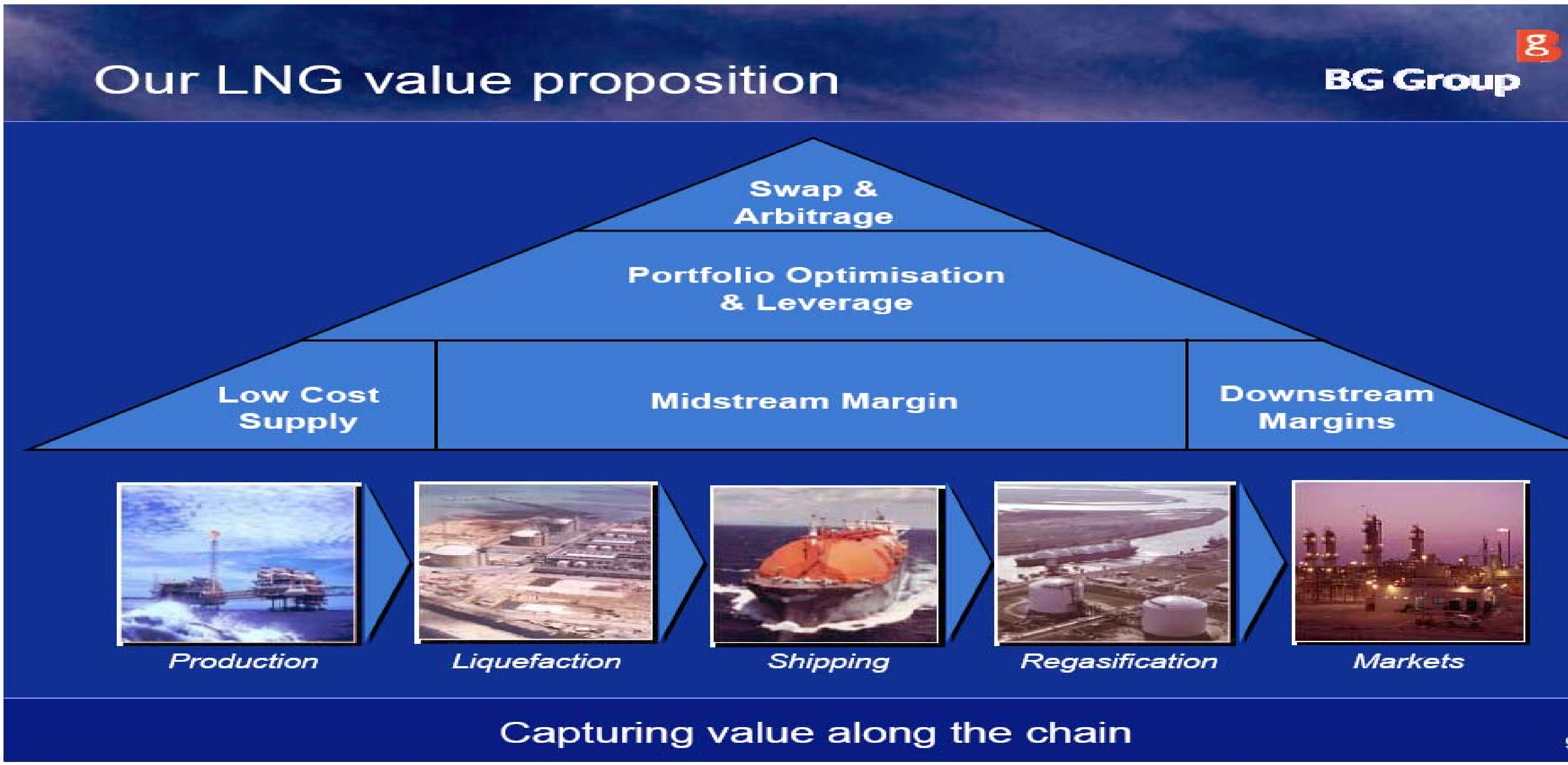
Secretary, IAMU

LNG Supply Chain

Shipping = The Unique Segment

So many Flag States, So many Qualities [Source: BG Group Presentation]



High Quality LNG Shipping Services

"Are they available like air or water?"

Correct Answer:

"No, they are not."

The Challenges

1. Shortages

2. Room for improvements in the current system

Shortages

Shortage of qualified seafarers for LNG carriers both for existing ships and for the new buildings

Shortage of time to educate and train qualified LNG officers in time for the expected deliveries

Shortage of the capacity for educating and training LNG qualified seafarers worldwide in terms of facilities, on board training capabilities, and above all, having enough qualified instructors with sufficient experience of actual service on board LNG carriers to educate and train LNG seafarers of the next generation.

Shortage of opportunities to exchange accumulated know-how, expertise and lessons of all kinds for the overall enhancement of seafaring human resources in the LNG supply chain.

[A] Shortage of qualified LNG seafarers

(1) World's LNG fleet (As of end May, 2005) Source: Clarkson

a) Serving as of May, 2005: 182
b) Total LNG fleet (Est. end of 2009): 339-354 (or even more)

(2) Composition of an LNG ship (A Actual Model)

(i) Senior Officers (Management Level) : 6
(ii) Junior Officers (Operational Level) : 4
(iii) **Total number of Officers : 10**
(iv) Ratings : 17
(v) **Total composition : 27**

(3) Demand for LNG Officers by the end of 2009:

Newly required seafarers:	Total	Officers	Senior Officers
	12,870-14,040	4,290-4,580	2,576-2,810

[A] Shortage of qualified LNG seafarers - continued

(1) Another critical factor:

Retirement of Existing qualified LNG officers worldwide – ref. Japanese case

(2) General trend worldwide:

Next generation not following

- "3D's are not attractive"
  - (i) Dangerous
  - (ii) Dirty
  - (iii) Donkey
- ref. SIGTTO statement

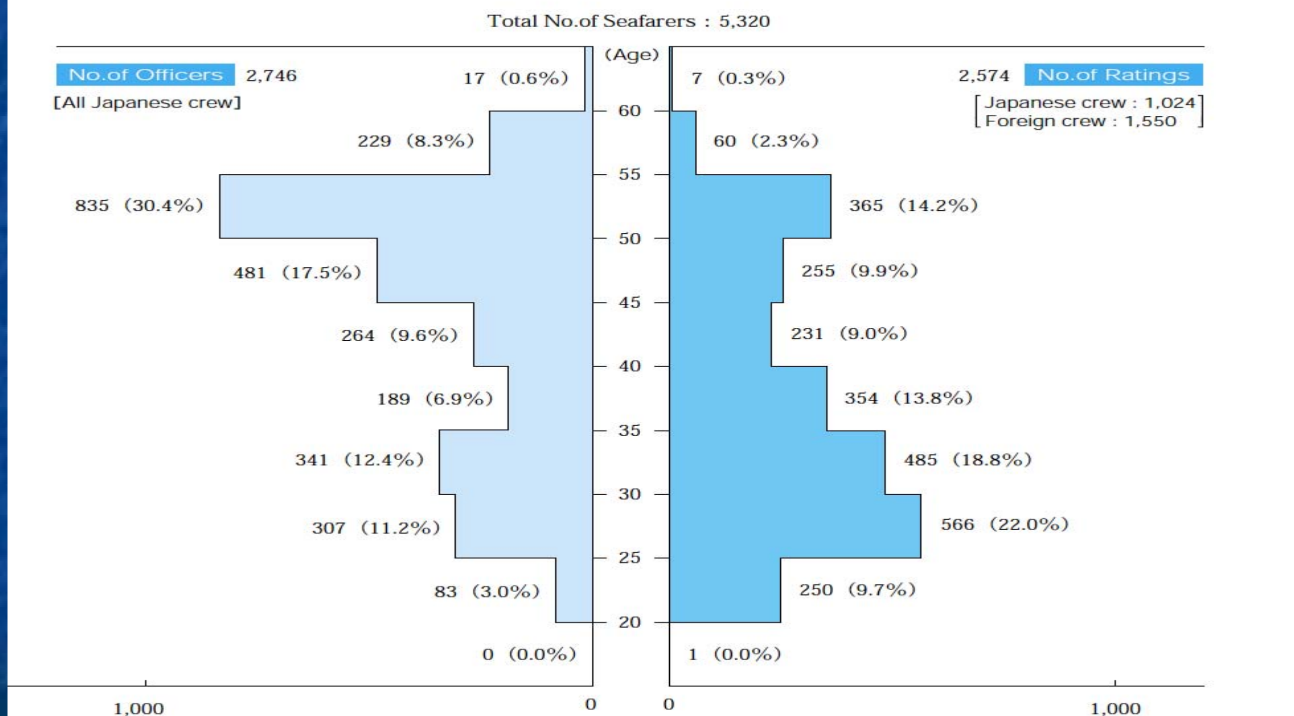
Ageing Officers: A Case of Japan

[Source: Japanese Shipowners' Association]

III. *Current Status of Oceangoing Seafarers*

2. Number of Seafarers by Age

- As of October 1, 2002, middle-aged and elderly seafarers occupy a large portion of all seafarers employed by oceangoing shipping companies. Officers over 40 years old account for 66.5% of all officers.



Notes:
① *Sources :* Ministry of Land, Infrastructure and Transport, Seafarers Statistics.
(Figures according to the Form No.2 : Seafarers employed by shipowners with a total owned vessel tonnage of over 1,000 G/T.)
② Sum of on-board and reserved crews
③ The 2,574 ratings include 1,550 non-Japanese crewmembers.

[A] Shortage of qualified LNG seafarers – reference: SIGTTO statement

(1) 68% of UK Officers are over 40 years old,
(2) only 19% of EU officers come from EU countries,
(3) there are 1,000 cadets in total from UK, although
(i) UK needs 600 new cadets each year to sustain a shipping presence,
(ii)100 cadets alone needed to maintain shore posts in UK, and
(iii) high cadet wastage still remains a significant problem,
(4) there are 14,000 maritime jobs in London now, out of which 1,000 maritime lawyers and 1,000 marine surveyors in UK are ex seafarers,
(5) 50% of Maritime and Coastguard Agency (MCA) of UK staff are over 50 years of age.

[Quoted from the verbal report of Capt. James MacHardy, G.M. in April, 2005 in Malaysia]

[A] Shortage of qualified LNG seafarers - continued: Turbine engineer

A Critical Example

An estimated demand (As of the end of May, 2005)

Year	Deliveries	Newly required turbine engineers	
		Officers	Senior Officers
2004(4th Qtr)	2 (delivered)	26	16
2005	20	260	156
2006	27	351	211
2007	30	390	234
2008-2010	86 - 101	1,118-1,313	671-788
Total	165 - 180	2,145-2,290	1,287-1,374

***The Challenge: physically limited Supply capacity*.**

[B] Shortage of time

(1) Time available till 2009: 3.5 years

(2) Time needed to nurture a senior officer: 10~12 years

[C] Shortage of the capacity for education and training

(1) Existing Capacity:

(i) First class LNG Owners/Operators

(ii) First class LNG ship managers

(iii) First class LNG training centers

(2) Increase of capacity is difficult and takes time: especially in the area of:

(i) *Instructors*

(ii) *On board training cabins*

[D] Shortage of opportunities to exchange accumulated know-how, expertise and lessons of all kinds

For the LNG industry of prestigious safety record, especially ***the sharing of lessons is critically important.***

↑

The Heinrich's Principle

1 : 29 : 300

Quality Control over Seafarers: Current Status

Simple questions to ourselves

Do we know:

- How many questions per subject at each flag state?
- Multiple choice or descriptive?
- In case of multiple choice, how many candidate answers are prepared – 2? 4? 6?
- What is the level of success - 50%?, 75%?
- What is the average % of success – 25%? 50% or even higher?

A Quotation

Concerning "appropriate" gas tanker experience mandated by STCW95 for certification and endorsement, ***"flag state administrations interpret the requirement for experience differently."*** The current best industry practice of the training voyage requirement for 28 days, "or at least one loading and one discharge operation" are "sensible approaches and ***should be considered in addition to the requirements of any particular administration***."

Source:

SIGTTO, *Crew Safety Standards and Training for Large LNG Carriers-Essential best practices for the Industry*, First Edition, Witherbys Publishing, London, 2003, p.9 (2.2.4 Experience) [Bolded, italicized and reddened by this author]

Room for Improvements

A Critical Mechanism for High Quality

i.e.

A function of "***<u>Assessment of Competence</u>***"
of each and every seafarers serving on board LNG ships by:

(1) Fair and Objective Internationally standardized ***Examination***,

(2) By Internationally recognized ***Third Party Assessors***

on cross border basis. (Maybe on voluntary basis)

Summary: The Challenges

(1) **Quality**: No compromise

(2) **Quantity**: How to meet the exploding Demand

(3) **Time**: This is ***"A War against Time"***

(4) ***How*** **:** ***NOBODY HAS AN ANSWER !!***

The Facts & Figures

Flag States of LNG Ships of the World (As of September, 2005)

(A) National Flag [12 Countries] (Total: 89 ships)
Algeria (6 ships), Australia (4 ships), Brunei (8 ships)
EU 7 (Belgium, France, Italy, Luxemburg, Malta, Spain, and UK) (28 ships), Japan (25 ships), Malaysia (18 ships)

(B) International Shipping Registry [3 Countries]
(Total: 14 ships): NIS (9 ships), DIS (1 ship),
Isle of Man (IOM) (4 ships)

(C) Other Flag States [7 Countries] (Total: 71 ships)
Bahamas (6 ships), Bermuda (12 ships), Liberia (16 ships),
Marshall Island (8 ships) Panama (20 ships),
Singapore (7 ships), St. Vincent (2 ships)

(D) TOTAL : 22 Countries (174 ships)

Source: DGO

LNG Past & Present - Regional Trade

1. Safety System realized on the Regional basis:

   a) Pacific Basin
   b) Mediterranean Basin
   c) Caribbean Basin → Shell, BP & Japanese & Koreans

2. Seafarers: a) Japanese crew for Japanese fleet → Charterers accepted "Premium" in freight

   b) Oil Majors: Foreign Crews → Expertise Accumulated

The Paradigm of Regional Trade

[As of September, 2004]

1. The world LNG Fleet: Total 174 ships

   a) Japan Trade: 76 ships
   b) Other Trades: 98 ships

2. Operators: [Figures in () is % share of nos. of ships]

   a) Total : 35 Companies
   b) The Biggest: STASCO (Shell) 22 ships (13%)
   c) Top 5 companies: 77 ships (44%)
   d) Top 10 companies: 111 ships (64%)
   e) Top 15 companies: 141 ships (81%)

The Paradigm of Regional Trade (Continued)

3. Trading Routes/Age Structure (Japan & Other Trades):

Year built	World Total	Japan Trade	Other Trades
1960's	5 (3%)	- (-)	5 (5%)
1970's	42 (24%)	14 (18%)	28 (29%)
1980's	23 (13%)	14 (18%)	9 (9%)
1990's	43 (25%)	34 (47%)	9 (9%)
2000's	61 (35%)	14 (18%)	47 (48%)
TOTAL	174 (100%)	76 (100%)	98 (100%)

Observation: (i) The age of Japan up until 1990's.

(ii) The explosion of Non-Japanese trades

→ The shift of paradigm: Regional Trade to Global Trades

LNG in a Rapidly Growing Future – Globalization

1. The Changes:

a) Paradigm :	Regional	→	Global
b) Trade Routes:	South/North	→	East/West
c) Ship Size:	140,000 cbm	→	230,000 cbm
d) Operators:	Experienced	→	New Entrants

*The change is progressing NOW:

(i) Very short time: 2004-2008

(ii) Big Expansion: 100 + alpha New building ships

LPG Tanker・ Yuyo Maru No.10 at Tokyo Bay (1974)

IAMU MAP

Where IAMU Members Are
Satakunta Polytechnic Sector for Technology and Maritime Management
Admiral Makarov State Maritime Academy
Odessa State Maritime Academy
World Maritime University
Gdynia Maritime University
Maritime University of Szczecin
Liverpool John Moores University
University of Plymouth
Kyiv State Maritime Academy
E.N.M.M. Marseilles Merchant Marine Academy
University of Cantabria Escuela Superior de la Marina Civil
Faculty of Nautical Studies, Polytechnical Univ. of Catalonia*
University of Rijeka, Rijeka Faculty of Maritime Studies
Constantza Maritime University
Fisheries and Marine Institute of Memorial University of Newfoundland
Maine Maritime Academy*
Massachusetts Maritime Academy
State University of New York, Maritime College
U.S. Merchant Marine Academy
The California Maritime Academy
Arab Academy for Science and Technology and Maritime Transport*
Nicola Y. Vaptsarov Naval Academy
Istanbul Technical University, Maritime Faculty*
Dokuz Eylül University, School of Maritime Business and Management
Far Eastern State Technical Fisheries University
Korea Maritime University
Mokpo National Maritime University
The Nippon Foundation
Tokyo University of Mercantile Marine
Dalian Maritime University
National Taiwan Ocean University
Shanghai Maritime University
Kobe University of Mercantile Marine*
Australian Maritime College*
* Representative Universities

An IAMU Proposal

To establish a platform for A Global Collaboration for Globalized LNG Paradigm of LNG Supply Chain of 21st Century.

1. No Single stakeholder is Versatile.

   i.e. Each party has Strength and Weakness
   e.g. LNG operational Know how is monopolized by The Experienced …but Ageing is now biting…

2. The Key Words:
   a) No Compromise in Quality
   b) Global Teamwork for Total Quality Control
   c) Transparency …especially, share the lessons from failures
   d) Common Assessment System of Competence of Each and Every Seafarers

Thank you

for your kind attention

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