

## Course Materials

- Copy of presentation slides (b/w) with sketches, block diagrams, flow diagrams and photographs for clarity and concepts.

## Registration Information

**Enquiries :** Please contact Gabriel ONG for more information Tel: (65) 6516 5113 or e-mail: [gab@nus.edu.sg](mailto:gab@nus.edu.sg)

**Fee :** Local Participants : SGD 749.00 (Inclusive of 7% GST)  
Overseas Participants: SGD 700.00 (GST exempted)

**Payment :** Payment is required prior to the course. Crossed cheques should be made payable to "National University of Singapore" and mailed together with the registration form to the mentioned address.

**Discount :** Ten percent (10% max) discount is applicable to:

- NUS Alumni Members
- Organisations / Companies sending three or more participants.

### **Refunds and Cancellations:**

- A 50% refund will be made for withdrawals (received in writing) ten (10) working days before the commencement of the course.
- No refunds will be made thereafter. However, a replacement will be accepted upon prior arrangement at no extra cost. Please inform us of the changes, if any, by fax

The Professional Activities Centre reserves the right to cancel the course and fully refund the participants, should unforeseen circumstances warrant it. Every effort will be made to inform participants of any changes.

**Website :** <http://www.eng.nus.edu.sg/PACentre>

## REGISTRATION FORM

### **The "A to Z" of Liquefied Natural Gas (LNG)**

**4 – 5 November 2009**

9.00 am – 5.00 pm  
(Registration at 8.30 am)

Course Fee: Local Participants SGD749.00 (Inclusive of 7% GST)  
Course Fee: Overseas Participants SGD700.00 (GST exempted)

Name of Participant: Dr/Mr/Mrs/Ms:  
(Attach your name card, if any)

Designation:

Name of Organization:

Address:

Contact Person: Email:

Tel No (O): Fax No:

Dietary Preference: NUS Alumni  
Membership (if any)  
No Pork No Lard / Vegetarian

Payment Mode:

**Cheque/Bank draft No.:**  
Payable to "National University of Singapore"

**VISA / MSTR / AMEX** Expiry Date

Amount (S\$)

Company Stamp/  
Authorised Signature : \_\_\_\_\_

Mailing address: Professional Activities Centre  
NUS, Faculty of Engineering  
9 Engineering Drive 1, Blk EA #05-34  
Singapore 117576  
Fax: +65 6874 5097

**Closing Date :** Please send in your registration form together with your payment by **28 Oct 2009** : Fax : (65) 6874 5097



# The "A to Z" of Liquefied Natural Gas (LNG)

(PDUs Pending Approval)

By

**Dr U.K. Dutta**  
CEO, The Technomanage Group



**Date:**  
4 – 5 November 2009

**Venue:**  
National University of Singapore

Organised by:  
**Professional Activities Centre**  
**Faculty of Engineering**  
**National University of Singapore**

## Introduction

The course has been specially developed for operators, engineers, planners and GETs involved with the Natural gas and LNG industry. The course has been conducted for major companies as part of their Technical Program curricula. It covers a wide range of topics from the source of gas to liquefaction, transportation, LNG Terminal, HSE, and LNG utilization.

## Course Outline

### 1. LNG Cycle

- Introduction
- Origin of Hydrocarbon Reserves
- What is Natural Gas
- Gas fields and reserves
- Natural Gas Composition
- Physical properties of Natural Gas
- Hazardous properties of Natural Gas
- Why LNG
- LNG Cycle – Source to the consumer
- Major LNG producers

### 2. LNG Upstream – Process and Economics

#### Part- A Process:

- Production System for Gas – offshore and onshore
- Gas Purification –
  - Dehydration
  - Sweetening
  - Mercury removal
- Basics of Refrigeration
- Liquefaction of Natural Gas
- Storage of LNG
- LNG Tankers – capacity and loading system

#### Part – B Economics

- Price of Gas
- Cost of Liquefaction
- Utility consumption

### 3. LNG Downstream – Receiving Terminal

- Tanker Unloading System
- LNG Storage
- Revaporization of LNG
- Heat Recovery
- Utilization and distribution of gas
- Cross country pipeline and consumer development
- Economics of LNG Receiving Terminal- utilities and investment
- Cost of gas at battery limit

### 4. Safety and Environment

- Hazards in Natural Gas and LNG handling
- Safety features in processing of LNG
- Safety features in storage and transportation of LNG
- Accident case histories and causes

### 5. Macro-economics and Technology Trends

- Factors affecting LNG price
- Investment consideration – upstream and downstream
- Cost at the tanker
- Transportation costs
- Site selection criteria
- Marine jetty design consideration and navigation safety
- Economic LNG plant capacity
- Small scale LNG plants
- Current trends in technology
- Major LNG projects worldwide



## Course Lecturer(s)

### Dr. U.K. Dutta

Doctorate in Chemical Engineering from Loughborough University of Technology (U.K), he has over 35 years of experience in Hydrocarbon Industry (upstream and downstream) in the areas of process and technology, engineering, project management, marketing and organizational development. He had work experience in process design and engineering with major Indian and International companies like EIL, Union Carbide, CE Natco, Lummus Crest, Triune and Rotary Engineering. He has presented papers on Technology Development and Technology Transfer in major International Conferences such as ASCOPE and CHEMTECH. Presently he is running his own consultancy firm, 'Technomanage Consultants' with base at Singapore and India. Has acted as process consultant for technology selection and process design for major Gas processing and LNG projects. He has conducted training for executives for major companies like Petronas (Malaysia) and Petrosin (Singapore), Kvaerner (Philippines), Yokogawa (India) and open programs for executives in Singapore jointly with National University of Singapore.

### Mr. Sham Sunder

M.S. in Chemical Engineering from Oklahoma State University, he has over 35 years of experience in the areas of Natural Gas Processing, Gas Transportation and planning/execution of LNG Terminal. After his M.S. he worked in the USA in a major petrochemical company in Technical Services Department. Later he worked as Process Manager responsible for design and engineering of cryogenic gas processing facility at Engineers India Ltd. Subsequently he was in senior management position at Gas Authority India Ltd., responsible for planning and execution of major cross-country Natural gas Pipeline. His last assignment was with Petronet LNG Ltd., where he was responsible for conceptualizing, planning and execution of two major state-of-the-art LNG Terminals in India.

## Methodology of Presentation

- Microsoft Power Point with colorful slides packed with information.
  - Video strips and flash animations for better clarity.
  - Highly interactive with total involvement of the participants.
  - Interesting and Interactive Quiz Sessions, group tasks for better assimilation.
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