AN INTRODUCTION TO LNG BUNKERING

Nigel Draffin

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PETROSPOT
TRANSPORT, ENERGY & MARITIME INTELLIGENCE

Dedication

This book is dedicated to the thousands of marine engineers who have safely transported LNG cargo, burned the methane gas in their ships' engines and demonstrated that LNG and methane fuel are safe, efficient and effective. They have done so since 1964 with an almost unblemished safety record.

It is also dedicated to the engineers and naval architects who made the concept into a practical reality, especially L.R. Prew (Roy) and Roger C. Ffooks.

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by

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M.I.Mar.E.S.T.

First Edition

Foreword by
Mogens Schrøder Bech
Danish Maritime Authority

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Foreword

Shipping has been under tremendous stress in recent years. Overcapacity in most segments as a result of many orders for new ships in the first decade of the 21st century and a fall in the volumes expected to be carried by sea are the main reasons for this. The picture does, of course, vary for each individual shipping segment.

In addition, shipping continues to be hit by soaring oil prices, as do other highly energy intensive industries. Consequently, ship owners must look for more energy efficient ships and/or alternative fuels.

At the same time, international regulation has stipulated stricter emission requirements with the aim of improving the environment and the health of citizens.

From 1 January 2015, shipping will be faced with a requirement for a 0.1% sulphur content in fuel in some sea areas, such as Northern Europe, the United States and Canada, whereas international shipping will be required to meet a 0.5% limit from 2020 or 2025 if lower sulphur fuel is not available in sufficient quantities. At the same time, lower emissions of nitrogen oxides will be required in some sea areas from 2016.

An obvious answer to these demands is to use LNG as a ship's fuel. But the answer is not easy as there are other fuel options and new ones will emerge from laboratories in the future.

The use of LNG as a ship's fuel is supported by the fact that LNG production facilities are in place to meet the global demand and that efficient logistical import terminal systems are serving hinterland gas grids. Furthermore, natural gas reserves seem abundant and new production facilities are being planned and constructed.

This backbone of production and terminals creates a good basis for establishing an infrastructure of small and medium-scale terminals, bunker vessels and trucks for supplying LNG as a bunker fuel. Such an infrastructure is costly and the only way forward for creating low unit costs for the infrastructure element of the LNG bunker price is a combination of economies of scale and flexible migration strategies.

And as regards price, a spread has developed between oil-based fuels and LNG. Two years ago, ship owners looked for the price of LNG to be pegged to oil and they were reluctant to take advantage of a possible upside from such a price spread. Today, however, many ship owners are seeking to take advantage of this situation.

Looking to the future and the price of LNG compared to oil-based products, I think of the words of a famous Danish humourist: 'It's tough to make predictions,

especially about the future.' Much uncertainty prevails about LNG pricing; however, the ship owner must take a decision.

The turnaround time in ports is also a critical issue for ship owners, and bunkering procedures must be seen from an economic perspective, including turnaround costs, as well as from a safety point of view. LNG is a new fuel for shipping and, in its early days, its use will create uncertainties for regulatory authorities as well as for the wider public. In this context, I warmly welcome *An Introduction to LNG Bunkering* by Nigel Draffin.

Mogens Schrøder Bech
Danish Maritime Authority

April 2013

Preface

Over the past few years, I have been asked questions about the prospects for the use of methane as a fuel for merchant ships – especially those that are not dedicated LNG tankers. It became clear to me that there was a need for a small book that would explain the practical issues involved with the use of this fuel and the technology and operational requirements for its safe storage and use.

This book is intended for people with a working knowledge of ships and bunkering operations but little or no experience of gas as a fuel or LNG as a storage medium. It focuses on the storage and transfer of the fuel in liquid form although it does discuss the option for storage as a compressed gas.

The use of methane for non-LNG tankers is still in its infancy and, as the practice develops, some of the topics discussed here may become either redundant or unnecessary. However, at this stage it seems prudent to cover all options.

I am sure that there will be some topics I have failed to cover in sufficient detail and others which are given in more detail than needed, but as much of the technology is still novel I hope readers will forgive any shortcomings.

There are over 300 LNG tankers burning methane fuel in boilers and diesel engines and more than 35 other LNG fuelled vessels now in service. Once the International Gas Fuelled Ship Code (IGF Code) is finalised by the International Maritime Organization (IMO) (which we anticipate will be in 2014), we can expect to see an exponential rise in the number of vessels using methane to meet the requirements of reducing sulphur oxides, nitrous oxides, particulate matter and greenhouse gases in their exhausts.

It is common to hear pundits explaining that this is ‘not rocket science’. Well, in the case of LNG, a large part of it *is* rocket science as much of the equipment and many of the techniques have come from the development of space rockets. It is a tried and tested solution, used extensively at sea and onshore, and will become a valuable addition to conventional marine technology.

Any fuel that can be used as fuel for large trucks delivering goods to supermarkets in cities around the world should hold no terrors for the marine industry.

Nigel Draffin

April 2013

About the author

With the publication of an *Introduction to LNG Bunkering*, Nigel Draffin cements his position as a highly respected and prolific author on the marine fuels industry. This new book is a timely and valuable addition to his five titles on bunkering already published. Nigel's bunker books have sold all over the world and contribute enormously to the knowledge and understanding of both new and experienced members of the bunker fuels industry.

Nigel has been involved in shipping for almost 50 years and with the commercial bunker market for over 25 years. After joining Shell Tankers as an apprentice engineer in 1966, he progressed through the ranks, serving on all classes of vessel, including very large crude carriers (VLCCs) and liquefied natural gas (LNG) tankers.

He came ashore in 1979 to join the newbuilding department of Shell International Marine. After two years of new construction in Ireland, South Korea and the Netherlands, he transferred to Shell's Research & Development unit, specialising in control systems, fuel combustion and safety systems.

In 1986, Nigel moved to the commercial department as a bunker buyer and economics analyst. In 1988, he was promoted to be Head of Operational Economics, responsible for all of the fuel purchased for the Shell fleet, the operation of the risk management policy and the speed/performance of the owned fleet. In March 1996, he joined the staff of E.A. Gibson Shipbrokers Ltd in the bunker department, and became the manager. In 2006, this department merged with US-based broking house LQM Petroleum Services, where Nigel is currently Senior Broker and Technical Manager.

Nigel is a founder member of the International Bunker Industry Association (IBIA) and has served several times on its council of management and executive board. Most recently, he served as the association's Chairman. He is the author of IBIA's *Basic Bunkering Course* and Director of Petrospot's leading training events, the *Oxford Bunker Course*, the *Oxford Bunker Course (Advanced)*, and *An Introduction to LNG Bunkering*. Nigel is a member of the Institute of Marine Engineering, Science and Technology and Past Master of the Worshipful Company of Fuellers.

Llewellyn Bankes-Hughes
Managing Director
Petrospot Limited

April 2013

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I also acknowledge the help and comments given to me by many participants in conference sessions on LNG over the last two years. There are many others who helped, too many to be named here, but without their assistance this book would never have appeared.

Nigel Draffin

April 2013

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