

**THE ROYAL INSTITUTION OF NAVAL ARCHITECTS
IN ASSOCIATION WITH
THE HELLENIC INSTITUTE OF MARINE TECHNOLOGY**

INTERNATIONAL CONFERENCE

on

LNG / LPG SHIPS 2018

Athens, Greece, 5th December 2018

PROPOSED PAPER ABSTRACT

Topic areas:

Floating storage, re-gasification and processing
Optimisation of power plants
Issues associated with partial filled tanks
Reliquefaction
Ship to ship transfer systems
Conversions

Title:

Near-shore floating liquefied gas storage and processing

Authors:

Keith W Hutchinson BEng(Hons) CEng CMarEng FRINA FIMarEST FSNAME
Consultant, Safinah Ltd,
5, Keel Row, Watermark, Gateshead. Tyne and Wear. NE11 9SZ. United Kingdom.
Email: keith.hutchinson@safinah.co.uk
Email (Home): k.w.hutchinson@btinternet.com
Mobile: +44 (0)7525 583 369.
Switchboard: +44 (0)1670 519 900.
Fax: +44 (0)1670 519 911.

David C Dobson BSc(Hons) MBA CEng FRINA
Market Sector Manager – Protective, Safinah Ltd,
5, Keel Row, Watermark, Gateshead. Tyne and Wear. NE11 9SZ. United Kingdom.
E-Mail: david.dobson@safinah.co.uk
Mobile: +44 (0)7519 119 866.
Switchboard: +44 (0)1670 519 900.
Fax: +44 (0)1670 519 911.

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Abstract:

There is a continuing growth in the application of natural gas for electrical power generation, industrial and domestic consumption. Hence, natural gas is increasingly being transhipped in its cooled transitory form of Liquefied Natural Gas (LNG), primarily via sea utilising large conventional LNG Carriers (LNGCs) but increasingly also smaller coastal LNGCs and LNG Bunker Vessels (LNGBVs) / Gas Supply Vessels (GSVs). As a consequence of these factors there is a significant and rising demand for various frame sizes of floating LNG reception and utilisation facilities, namely LNG Floating Storage and Offloading (LNG FSOs) reception / distribution vessels, Floating, Storage and Regasification Units (FSRUs), LNG Floating Power Barges (LNGFPBs) or ships, etc.

Such nearshore moored floating LNG assets can inherently provide a supply of natural gas or electrical power to locations where traditional (fixed) land-based infrastructures are either uneconomic, prohibited by geographical or geological issues, or where demand is only temporary or seasonal. Additionally, the speed with which such floating LNG assets can be brought into commercial operation favours applications where there is a short mobilisation schedule or execution demands. Locations particularly suitable for floating LNG include emerging markets of island and coastal states, communities / facilities not connected to an existing 'national grid' of gas pipelines or electricity distribution, and isolated industrial or power-generating plants (for instance, gas-fuelled power stations). Hence, floating LNG assets are a particularly cost-effective vehicle for providing natural gas to market and facilitates solutions that are low-risk, flexible and inherently able to readily adapt to changing market conditions.

Drawing on nearly two decades of experience in the design and evaluation of numerous new-build designs, conversions and upgrades of nearshore floating LNG reception and utilisation facilities together with a decade of experience in the design of conventional and highly novel and innovative LNG sea transportation vehicles, of all capacities and configurations, the authors will consider the development and increasing deployment of floating LNG throughout the world. In order to 'set the scene', the history and development of LNG shipping and offshore and near-shore floating LNG assets over the past half century will be briefly discussed.

Design and technology selection aspects for floating LNG supply and utilisation chain options will be covered, including types and configuration of LNG FSOs, FSRUs, LNGBVs etc. including the many common, and some unique, but often conflicting and diverse design and operational criteria which must be addressed coherently within the design process in order to generate robust and safe solutions. The paper shall also address the possible areas of operation / deployment for such floating LNG assets, including the future of LNG as a fuel, both in the marine sector and on land, together with its processing and distribution.

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Authors Biographies (for information only):

Keith W Hutchinson is a Consultant with Safinah at their Tyneside offices in Gateshead, United Kingdom, where he undertakes commercial and offshore marine consultancy for a range of clients globally. Over a 30 year career as a ship designer and naval architect he has been constantly at the forefront of the technical development of robust but flexible concept / basic designs for a multitude of extremely novel / complex / bespoke merchant, offshore and naval vessels, both new-build and conversions – ranging from sub 20 metre high speed catamarans / landing craft to FPSOs / FLNGs in excess of 500 metres for the harshest of environments, consistently striving with clients to explore unknown multiple dimensional design spaces.

Keith graduated in Naval Architecture and Shipbuilding from Sunderland Polytechnic, now the University of Sunderland, in 1990 and from the University of Newcastle upon Tyne in 1992 with a Bachelor of Engineering in Marine Technology with First Class Honours in Naval Architecture. Having worked in Shipbuilding and Shiprepair yards on the River Tyne, he joined Swan Hunter Shipbuilders in 1990 and in 1992 was appointed Senior Designer within the Naval Architecture Section of the Basic Design Department. Upon joining marine design consultants Armstrong Technology in 1995 he was seconded to the Newcastle University's Engineering Design Centre (EDC) for over three years as a Research Associate developing decision support tools for the evaluation, optimisation and selection of safer RO-RO ship designs and other marine vehicles. Returning in 1998 as a Naval Architect he over the next 20 years rose to be a Senior and then the Principal Naval Architect, finally becoming Engineering Manager responsible for the coordination and management of all multidisciplinary engineering teams formulating design solutions together with cost estimating and investment appraisals on Tyneside and also Chief Engineer for Commercial Marine within Babcock, who had acquired Armstrong Technology in 2000, and hence as senior Technical Authority also responsible for all governance aspects relating to whole ship design, engineering etc. He was also Subject Matter Expert (SME) for the Naval Architecture domain, hence Company Naval Architect, across all Babcock offices in the United Kingdom responsible for hydrostatic, dynamic, arrangement and regulatory evaluations etc.

Keith has published over 40 technical papers and articles on naval architecture and ship design etc. in addition to being invited to give almost 30 presentations on aspects of ship / offshore vessel design and performance. He is a Member of Lloyd's Register's (LR) main merchant ship Technical Committee (TC), Offshore Technical Committee (OTC) and their Naval Ship Technical Committee (NSTC). He is also an industry 'Briefing Member' for the United Kingdom's Delegation to IMO's Ship Design and Construction Sub-Committee. He is a Chartered Engineer (CEng), Chartered Marine Engineer (CMarEng), Fellow of The Royal Institution of Naval Architects (FRINA), Fellow of The Institute Marine Engineering, Science and Technology (FIMarEST) and Fellow of The Society of Naval Architects and Marine Engineers (FSNAME). He is active in the North-East Coast Joint Branch of IMarEST and RINA, being Honorary Treasurer and previously serving as Chairman and Vice-Chairman. He is a Professional Review Interviewer (PRI) for membership of IMarEST and RINA and registration with the Engineering Council (EC). He is a founding Committee Member of SNAME's recently inaugurated Western Europe Section (WES) and is Technical and Research / Papers Chair, having previously served as Membership Chair.

David C Dobson is Market Sector Manager for Protective Coatings with Safinah at their offices in Gateshead on Tyneside, United Kingdom.

His career began in 1973 as a Ship Draughtsman with Swan Hunter Shipbuilders on the River Tyne. He attended Newcastle College, Sunderland Polytechnic and Newcastle University gaining a Bachelor of Science in Naval Architecture in 1983. He quickly joined the management team in Swan Hunter taking up various positions in production, production engineering and project management. He gained a Masters of Business Administration in Strategic Management in 1992. He left Swan Hunter in 1993 and subsequently worked in a variety of Offshore, Engineering and Shiprepair companies as General Manager and Director. He joined Babcock in 2007 and was Programme Director for the commercial marine and oil and gas business stream over an eleven year period.

David is a Chartered Engineer and was awarded Fellow of The Royal Institution of Naval Architects (FRINA) status in 1996.