 LNG BunkeringBUNKERING OF SHIPS WITH LNGDraft Environmental Impact Statement/environmental Impact Report for the Cabrillo Port Liquefied Natural Gas Deepwater Port, Ventura and Los Angeles Counties, California

RECOMMENDATIONS FOR LINKED EMERGENCY SHUTDOWN (ESD) ARRANGEMENTS FOR LNG BUNKERING.Ship Lifecycle

Issues and Prospect of Bunkering Industry in Malaysia - A Preliminary Study

Trends and Challenges in Maritime Energy Management

IACS Rec No. 142

The Relevance of Liquefied Natural Gas as an Alternative for the Shipping Industry to Comply with the Global SO2 Limits

An Introduction to Lng Bunkering

Branch's Elements of Shipping

Marine Design XIII Technology and Science

Marine Design XIII collects the contributions to the 13th International Marine Design Conference (IMDC 2018, Espoo, Finland, 10-14 June 2018). The aim of this IMDC series of conferences is to promote all aspects of marine design as an engineering discipline. The focus is on key design challenges and opportunities in the area of current maritime technologies and markets, with special emphasis on:

- Challenges in merging ship design and marine applications of experience-based industrial design
- Digitalisation as technological enabler for stronger link between efficient design, operations and maintenance in future
- Emerging technologies and their impact on future designs
- Cruise ship and icebreaker designs including fleet compositions to meet market demands
- To reflect on the conference focus, Marine Design XIII covers the following research topic series:
  
  - State of art ship design principles - education, design methodology, structural design, hydrodynamic design;
  - Emerging technologies and operations - ship concept design, risk and safety, arctic design, autonomous ships;
  - Energy efficiency and propulsions - energy efficiency, hull form design, propulsion equipment design;
  - Wider marine designs and practices - navy ships, offshore and wind farms and production.

Marine Design XIII contains 2 state-of-the-art reports on design methodologies and cruise ships design, and 4 keynote papers on new directions for vessel design practices and tools, digital maritime traffic, naval ship designs, and new tanker design for arctic. Marine Design XIII will be of interest to academics and professionals in maritime technologies and marine design.


Marine Design XIII Technology and Engineering includes the papers presented at the 2nd International Conference on Maritime Technology and Engineering (MARTECH 2014, Lisbon, Portugal, 15-17 October 2014). The contributions reflect the internationalization of the maritime sector, and cover a wide range of topics: Ports; Maritime transportation; Inland navigat

In 1974, a scientific conference covering marine automation group and large vessels issues was organized under the patronage of the Technical Naval Studies Centre (CETENA) and the Italian National Research Council (CNR). A later collaboration with the Marine Technical Association (ATENA) led to the renaming of the conference as NAV, extending the topics covered to the technical field previously covered by ATENA national conferences. The NAV conference is now held every 3 years, and attracts specialists from all over the world. This book presents the proceedings of NAV 2018, held in Trieste, Italy, in June 2018. The book contains 70 scientific papers, 35 technical papers and 16 reviews, and subjects covered include:

- comfort on board; conceptual and practical ship design; deep sea mining and marine robotics; protection of the environment; renewable marine energy; design and engineering of offshore vessels; digitalization, unmanned vehicles and cyber security; yacht and pleasure craft design and inland waterway vessels. With its comprehensive coverage of scientific and technical maritime issues, the book will be of interest to all those involved in this important industry.

This book covers the various advanced reciprocating combustion engine technologies that utilize natural gas and alternative fuels for transportation and power generation applications. It is divided into three major sections consisting of both fundamental and applied technologies to identify (but not limited to) clean, high-efficiency opportunities with natural gas fueling that have been developed through experimental protocols, numerical and high-performance computational simulations, and zero-dimensional, multizone combustion simulations. Particular emphasis is placed on statutes to monitor fine particulate emissions from tailpipe of engines operating on natural gas and alternative fuels.
This book collects the papers presented at the 7th International Conference on Risk Analysis and Crisis Response (RACR-2019) held in Athens, Greece, on October 15-19, 2019. The overall theme of the seventh international conference on risk analysis and crisis response is Risk Analysis Based on Data and Crisis Response Beyond Knowledge, highlighting science and technology to improve risk analysis capabilities and to optimize crisis response strategy. This book contains primarily research articles of risk issues. Underlying topics include natural hazards and major (chemical) accidents prevention, disaster risk reduction and society resilience, information and communication technologies safety and cybersecurity, modern trends in crisis management, energy and resources security, critical infrastructure, nanotechnology safety and others. All topics include aspects of multidisciplinarity and complexity of safety in education and research. The book should be valuable to professors, engineers, officials, businessmen and graduate students in risk analysis and risk management.

The combination of growing liquefied natural gas (LNG) supplies and new requirements for less polluting fuels in the maritime shipping industry has heightened interest in LNG as a maritime fuel. The use of LNG as an engine ("bunker") fuel in shipping is also drawing attention from federal agencies and is beginning to emerge as an issue of interest in Congress. In 2008, the International Maritime Organization (IMO) announced a timeline to reduce the maximum sulfur content in vessel fuels to 0.5% by January 1, 2020. Annex VI of the International Convention for the Prevention of Pollution from Ships requires vessels to either use fuels containing less than 0.5% sulfur or install exhaust-cleaning systems ("scrubbers") to limit a vessel's airborne emissions of sulfur oxides to an equivalent level. An option for vessel operators to meet the IMO 2020 standards is to install LNG-fueled engines, which emit only trace amounts of sulfur. Adopting LNG engines requires more investment than installing scrubbers, but LNG-fueled engines may offset their capital costs with operating cost advantages over conventional fuels. Savings would depend on the price spread between LNG and fuel oil. Recent trends suggest that LNG may be cheaper in the long run than conventional fuels. LNG bunkering requires specialized infrastructure for supply, storage, and delivery to vessels. To date, the number of ports worldwide that have developed such infrastructure is limited, although growth in this area has accelerated. Early adoption of LNG bunkering is occurring in Europe where the European Union requires a core network of ports to provide LNG bunkering by 2030. LNG bunkering in the United States currently takes place in Jacksonville, FL, and Port Fourchon, LA with a third facility under development in Tacoma, WA. Bunkering of LNG-fueled cruise ships using barges also is planned for Port Canaveral, FL. The relative locations of other U.S. ports and operating LNG terminals suggest that LNG bunkering could be within reach of every port along the Eastern Seaboard and in the Gulf of Mexico. On the West Coast, the ports of Los Angeles and Long Beach, CA, are near the Costa Azul LNG terminal in Ensenada, MX. Seattle and Tacoma are adjacent to the proposed Tacoma LNG project. Since 2015, Jones Act coastal ship operators have taken steps to transition their fleets to use cleaner burning fuels, including LNG. Shippers of dry goods to Alaska, Hawaii, and Puerto Rico have taken delivery or have ordered LNG-fueled and LNG-capable vessels from U.S. shipyards in Philadelphia, PA, and Brownsville, TX. Another company operates five LNG-powered offshore supply vessels built in Gulfport, MS. Depending upon LNG conversions, the global LNG bunker fuel market could grow to several billion dollars by 2030. If U.S. LNG producers were to supply a significant share of this market-on the strength of comparatively low LNG production costs-LNG bunkering could increase demand for U.S. natural gas production, transportation, and liquefaction. Opportunities in LNG-related shipbuilding might be more limited, as most shipbuilding occurs overseas, although domestically-constructed LNG bunkering barges could be one area of economic growth. Finally, engineering and construction firms could benefit from new opportunities to develop port infrastructure for LNG storage and transfer. However, while vessel conversion to LNG fuel may increase demand for U.S.-produced natural gas, it partially could be offset by reduced demand for U.S.-produced crude oil or refined products. Furthermore, while LNG can reduce direct emissions from vessels, fugitive emissions and environmental impacts from natural gas production and transportation could reduce overall emissions benefits. While the LNG industry has experienced few accidents, the Coast Guard has been developing new standards to address unique safety and security risks associated with LNG in vessel operations.

This document brings together a set of latest data points and publicly available information relevant for Manufacturing Industry. We are very excited to share this content and believe that readers will benefit from this periodic publication immensely.

Bachelor Thesis from the year 2017 in the subject Business economics - Trade and Distribution, grade: 1,0, Hamburg University of Applied Sciences, language: English, abstract: The International Maritime Organization confirmed in 2016 the introduction of a global sulphur cap in 2020, establishing a 0.5% sulphur content limit in fuels. All shipping companies operating in international waters will be affected by this emission regulation. LNG as a maritime fuel is widely thematised in current discussions regarding alternatives to achieve compliance, as it brings in the most significant environmental benefits. However, the current LNG-use is scarce, as vessels operating with LNG accounts for ca. 0.1% of the global fleet, and are mainly located in the Baltic region. To gain significance as a marine fuel, LNG has several challenges to overcome. LNGs main hurdle is the lack of bunkering infrastructure, which discourage its adoption by shipping companies, generating the so-called chicken-and-egg problem. Although small-scale bunkering facilities are already available, mostly in Northern Europe, the required infrastructure for large vessels is not provided. This study looks at the relevance of LNG as a maritime fuel with the focus on the forthcoming global sulphur cap, from the perspective of a small and a large shipping company, in their decision-making to achieve compliance. Thereby, major drivers and impediments considered by both shipping companies for its adoption as well as their forecast regarding the future of LNG in the shipping industry are discussed.

Forthcoming implementation of international and European environmental regulations, namely Marpol Annex VI and Directive 2012/33/EU, will force ship owners to assess technologies that can allow them to comply with regulation whilst helping them to improve their position in an increasingly competitive market. Given the European economy's fragile condition, prevailing uncertainty about its future and about the future evolution of key factors affecting the outcome of the ship owners' decisions, making the right choice among the multiple
feasible technologies available becomes a considerable challenge. For the past two years, the undersigned team of analysts have worked together in a study leading towards the
publication of this report. This analysis has been the Fundacion Valenciaport’s contribution to the European Union (EU) co-funded project “CO2 and ship transport emission abatement
by LNG” (the COSTA Project). The COSTA project has been coordinated by the Italian Ministry of Infrastructure and Transport and co-financed by the EU’s Trans-European Network for
Transport (TEN-T) Programme under the Motorways of the Sea Call 2011. Our objective has been to analyse which technology would give the best results for the ship owner to comply
with environmental regulations concerning emissions from a financial point of view. This has been done for those vessels that are particularly affected by this regulation, that is, each of
the 658 vessels deployed in short-sea shipping (SSS) lines calling at core ports in the Mediterranean and Black Sea EU countries and Portugal. Additionally, a cost-benefit analysis
including externalities has been conducted. As a result of this study, different scenarios on technology uptake towards 2030 for the Southern European SSS fleet have been defined.

Needless to say, there is no certainty of how many of the driving factors will behave in the next 15 years. The results published in this report are not definitive predictions of the
Mediterranean shipping sector in 2030. Instead, our main findings are intended to stimulate discussions about available options for the industry. By examining the entire SSS fleet
operating in the Mediterranean, Black Sea and Portuguese core ports, we hope to portray a general picture of the most convenient technological options for different kinds of vessels. In
addition, we hope to draw attention to the factors explaining most of the uncertainty over future results and provide useful information for both ship owners and policy-makers who may be
evaluating policies to foster the adoption of the technologies that are most environmentally friendly and contribute the most to the competitiveness of the shipping and shipbuilding
sector. This will contribute to the preparation of financial feasibility assessments and cost-benefit analyses of the studied technologies in order to start finalizing the decisions in the studied
vessels, in line with the collaboration of prominent industrial companies. We would like to thank experts working for MAN Diesel & Turbo, Caterpillar, Wärtsilä, Ros Roca Indox Cryo Energy, S.L., Boulfa
Corporación Marítima, RINA and Bureau Veritas for the information provided and for their help validating the results on the investment required for each ship in the SSS fleet to install
scrubbers, be retrofitted to LNG dual fuel or be substituted by a newly built vessel of similar characteristics and operating with LNG dual fuel engines, tanks and all the necessary
installations for this newbuilding to be LNG-compatible. Their support has also been crucial to check the operational costs of the ship for each pair of alternative options (the options compared have been: installing scrubbers, retrofitting to LNG dual fuel, newbuilding with HFO engines plus scrubbers, newbuilding with MGO engines (no scrubbers) and newbuilding
with LNG engines and other LNG-related installations). We share this report openly and free of charge to enhance the understanding of some of the challenges the shipping sector is
facing, to encourage comprehension of the driving factors that affect the future competitiveness of short-sea shipping in the South of Europe and grasp the potential consequences that a “do nothing” scenario would bring in terms of modal backshift and increase in the use of road transport for intra-European trade flows. We hope you find this report useful and
informative; and that it helps to stimulate discussion and thinking of the challenges, solutions and potential incentives to be put in place to favour the adoption of the technological
options that will foster the competitiveness of the European shipping and shipbuilding industries. We sincerely hope you will enjoy reading the following pages.

· Why is Malaysia far behind in the bunkering industry? · What is the economic potential of the bunkering industry? · Who should play the role of governing the industry? There is a dire
need to facilitate the bunkering industry in Malaysia, seeing as how 95% of world trade is seaborne. This book highlights five issues from the ground to illustrate the industry's behind-
the-scenes, complete with perspective from Malaysian industry players.

In an effort to contribute to global efforts by addressing the marine pollution from various emission types, this Special Issue of Ship Lifecycle for Journal of Marine Science and
Engineering was inspired to provide a comprehensive insight for naval architects, marine engineers, designers, shipyards, and ship-owners who strive to find optimal ways to survive in
competitive markets by improving cycle time and the capacity to reduce design, production, and operation costs while pursuing zero emission. In this context, this Special Issue is
dedicated to providing insights into the latest research and technical developments on ship systems and operation with a life cycle point of view. The goal of this Special Issue is to bring
together researchers from the whole marine and maritime community into a common forum to share cutting-edge research on cleaner shipping. It is strongly believed that such a joint
effort will contribute to enhancing the sustainability of the marine and maritime activities. This Special Issue features six novel publications dedicated to this endeavor. First of all, as a
proactive response to transitioning to cleaner marine fuel sources, numerous aspects of the excellence of fuel-cell based hybrid ships were demonstrated through four publications. In
addition, two publications demonstrated the effectiveness of life cycle assessment (LCA) applicable to marine vessels.

The environmental and economical advantages of using LNG as marine fuel have been recognized by the industry. In response to increasing demand, construction of LNG bunkering
infrastructure is under rapid development. Several ports are preparing to supply LNG, but uncertainties concerning the bunkering process and operational safety still exist. The goal of
this book is to establish probabilistic safety zones for a generic ship-to-ship (STS) bunkering case. Threats to vulnerable objects and the associated likelihood, in the event of an LNG
leak, is identified. The specific purpose is to determine whether acceptable safety levels for passengers are present onboard a ferry performing LNG bunkering operations.

Since the dawn of history, the sea has connected and divided human societies. In order to address this, increasingly ingenious and innovative technological solutions have been
developed, and the sea has never been an insurmountable barrier to mankind. This book presents the proceedings of ICNMM 2019, the 3rd International Conference on Nautical and
Maritime Culture, held in Naples, Italy, on 14 and 15 November 2019. The conference covers all conceptual and theoretical aspects relating to nautical and maritime culture, and topics
covered by the 21 papers presented here include: the history of ships and navigation; maritime museums and libraries; naval architecture and the evolution of marine engineering; the
conservation of nautical marine and maritime heritage; ship and nautical design; coastal areas; and the evolution of the waterfront and the coastal marine environment. The ICNMM
conference promotes dialogue between academics, professionals, and those involved in maritime research and development, and the book will be of interest to all those with an involvement in nautical and maritime culture.

This book gathers the peer-reviewed proceedings of the 14th International Symposium, PRADS 2019, held in Yokohama, Japan, in September 2019. It brings together naval architects, engineers, academic researchers and professionals who are involved in ships and other floating structures to share the latest research advances in the field. The contents cover a broad range of topics, including design synthesis for ships and floating systems, production, hydrodynamics, and structures and materials. Reflecting the latest advances, the book will be of interest to researchers and practitioners alike.

Port Economics is the study of the economic decisions (and their consequences) of the users and providers of port services. A port works as an "engine" for economic development. This book provides a detailed discussion of port freight service users, such as freight water and land carriers, that have their ships and vehicles serviced and their cargoes unloaded by ports, as well as passenger services such as ferry carriers which are serviced by ferry passenger ports. This text continues to enhance our understanding of port economics by exploring the economic theories, supply and demand curves, and the actual and opportunity costs relating to the carriers, shippers and passengers who use ports. This new edition has been updated throughout. This includes: An expanded discussion of container, break-bulk, dry-bulk, liquid-bulk and neo-bulk ports; An introduction of port service chains, hinterland transport chains, maritime transport chains and port multi-service congestion; A discussion of seaborne trade, dry ports, port centrality and connectivity and free trade zones. This updated and comprehensive introduction to port economics will be of benefit to students and researchers in their study of port economics and management. It is also of great importance to professionals who manage and operate ports as well as freight and passenger carriers.

This book contains all refereed papers accepted during the ninth edition of the conference that took place at the Cité Internationale Universitaire de Paris on December 18-19, 2018. Mastering complex systems requires an integrated understanding of industrial practices as well as sophisticated theoretical techniques and tools. This explains the creation of an annual go-between forum in Paris dedicated to academic researchers & industrial actors working on complex industrial systems architecture, modeling & engineering. These proceedings cover the most recent trends in the emerging field of Complex Systems, both from an academic and a professional perspective. A special focus is put on "Products & services development in a digital world". The CSD&M Paris 2018 conference is organized under the guidance of CESAM Community (http://cesam.community/en). CESAM Community has been developed since 2010 by the non-profit organization CESAMES Association to organize the sharing of good practices in Enterprise and Systems Architecture and to certify the level of knowledge and proficiency in this field through CESAM certification.

This authoritative Research Handbook presents, for the first time, a comprehensive overview of the most important research and latest trends in EU energy law and policy. It offers high-quality original contributions that provide state-of-the-art research in this rapidly evolving area, situated in the broader context of international economic law and governance.

Maritime-Port Technology and Development contains the latest research results and innovations as presented at the 2014 International Maritime and Port Technology and Development Conference (Trondheim, Norway, 27-29 October 2014). The volume is divided into a wide range of topics: Efficient and environmentally friendly energy use in ships and port
The topics addressed in this paper focuses on geographical prospects for gas by UNECE sub-region and then by exploring the new applications for gas within the region as a whole. The versatility of gas means it can be used for heat, for power, for combined heat and power (CHP), for petrochemicals and fertilisers, and in internal combustion engines. Natural gas can also be used as a source of hydrogen, and with biogas can contribute to decarbonization. Flexibility means there are considerable opportunities for expanded use of liquefied natural gas and compressed natural gas in land transport and for LNG at sea. New geographical markets are also available for natural gas in Southeastern Europe, and, especially, in parts of Russia and Central Asia. Prospects for new geographical markets and for new applications have to be considered against a background of increasing urgency about the need to tackle the climate emergency. Modelling carried out for the UNECE indicates that If the UNECE region is to meet the Paris target of limiting the increase in global temperature to no more than two degrees, then its 56 member States will have to invest an extra $180 bn a year for the next 30 years over and above what they might otherwise be expected to invest in energy. Yet the potential costs of failing to address the climate emergency are of a comparable magnitude. Striking the right balance will not be easy.

This book provides an overview of contemporary trends and challenges in maritime energy management (MEM). Coordinated action is necessary to achieve a low carbon and energy-efficient maritime future, and MEM is the prevailing framework aimed at reducing greenhouse gas emissions resulting from maritime industry activities. The book familiarizes readers with the status quo in the field, and paves the way for finding solutions to perceived challenges. The 34 contributions cover six important aspects: regulatory framework; energy-efficient ship design; energy efficient ship and port operation; economic and social dimensions; alternative fuels and wind-assisted ship propulsion; and marine renewable energy. This pioneering work is intended for researchers and academics as well as practitioners and policymakers involved in this important field.

Since it was first published in 1964, Elements of Shipping has become established as a market leader. Now in its ninth edition, Branch’s Elements of Shipping, renamed in memory of Alan Branch, has been updated throughout and revised to take in the many changes that have occurred in the shipping industry in recent years, including the impact of the economic crisis, the Panama Canal expansion and new legislation. All tables and data have been brought up-to-date and many new illustrations have been added. The book explains in a lucid, professional manner the basic elements of shipping, including operational, commercial, legal, economic, technical, managerial, logistical and financial considerations. It also explores how shipping markets behave and provides an overview of the international shipping industry and seaports. Filling a gap for the discerning reader who wishes to have a complete understanding of all the elements of the global shipping scene together with the interface with seaports, international trade and logistics, it remains essential reading for shipping executives along with students and academics with an interest in the shipping industry.

This book describes the feasibility and status of the use of alternative fuels in marine engineering, as well as the application of liquefied natural gas, biodiesel and their blends as marine fuels, and the combustion of synthetic coal-based fuels. Each chapter in the book ends with a summary, which gives the reader a quick and clear understanding of the main contents of the chapter. The book gives a lot of advice on the selection of equipment and parameters, fuel reserves and preparation for scholars related to alternative fuels in ships, and points them in the way. It contains lots of illustrations and tables and explains it in the form of chart comparison. The authors have developed mathematical models and methods for calculating the parameters of fuel systems for biodiesel fuels and liquefied natural gas. Recommendations for choosing the rational parameters of these systems are given, as are schematic solutions of the fuel systems, recommendations for selecting equipment, storing, and preparing the fuels. Application of the materials described in the book provides the SPP designers with a reliable tool for choosing rational characteristics of the fuel systems operating on alternative fuels and improving the efficiency of their application on ships.