



LNG in the maritime industry. Past, present and future

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As part of the regulatory framework addressing emissions controls for both sea and air, the MARPOL regulation deals with the commonly-accepted criteria for maritime traffic worldwide, although a number of specific regions have adopted stricter agreements on certain gases (EU, California, etc).

Annex VI of MARPOL limits emissions of gases into the atmosphere and also promotes energy efficiency improvements leading to reduced fuel consumption and therefore lower emissions. The gases most tightly controlled by this regulation are CO₂, NO_x and SO_x. These gases are limited both generally and also with respect to emission control areas (ECA), with emissions being monitored in a number of different ways:

1) CO₂. Tracked by means of the energy efficiency index. The conceptual basis for this index is the environmental cost divided by the benefit to society (i.e., the amount of CO₂ emitted per unit of load and mile travelled).

2) SO_x and NO_x. These emissions are controlled by limiting ship-generated emissions. Put simply, we can say that NO_x is produced in internal combustion engines with a high ignition temperature, while SO_x is a direct product of the sulphur in fuel.

The maritime world has consequently undergone a 'revolution' in terms of all things relating to alternative fuels (LNG, hydrogen, ethane, DME, methanol, etc.), as well as gas cleaning systems (scrubbers) and low- or very low-sulphur fuel oils, along with motors that can use 2, 3 or 4 different fuels depending on which zone they happen to be in. Research has been stepped up into ESD (Energy Saving Devices) as well as the use of HVSC (High Voltage Shore Connection). All these methods can currently be accommodated in the maritime sector, depending on the CAPEX and OPEX of each ship / port in question and above all, taking

into account current oil prices. In the long term, the future undoubtedly lies in using gas as a fuel. The current focus is on LNG since it is a 'clean' gas and is the most well-developed in both technical and regulatory terms.

The use of LNG offers a number of advantages compared to emissions from fossil fuels, as shown in Figure 1.

NOTE: Methane is much more harmful than CO₂ in terms of its global warming potential and therefore the reduction in CO₂ (energy efficiency) is 'only' 25%, due to the 'methane slip', which refers to the gas released into the atmosphere without burning. The other emissions show substantial reductions, with SO_x emissions eliminated altogether (natural gas does not contain sulphur). This decrease would enable a reduction in the EEDI of approximately 11-17%. As we can see, the use of LNG as a fuel will allow us to comply with environmental legislation in all aspects relating to emissions.

But although it may offer great advantages, the use of LNG as fuel also generates a certain level of uncertainty and a number of challenges to be faced:

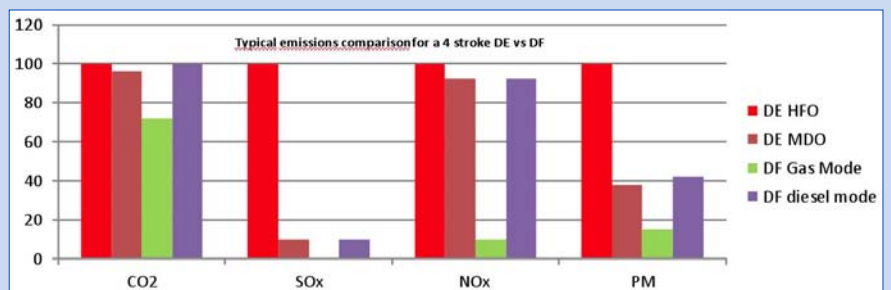
- The first of these, which has already been successfully resolved, was the "chicken and egg" dilemma. These days, however, there is infrastructure, supply vessels and consumer ships that allow the market to flourish. The growth in the market will clearly lie in small-

scale LNG, the short sea shipping market, regasification plants, bunkering, etc., but the wheels have been set in motion.

- The second is in regard to regulation. The IGF Code for low flashpoint fuels allowed the abovementioned fuels to be used in SOLAS ships. The original code and its subsequent amendments have created a regulatory framework that assures ship owners and ship builders when starting a new project or retrofitting an existing ship. Prescriptive rules similar to the IGC (International Gas Code, which has been long been used for LNG dual fuel systems) along with obligatory targets, in which risk analysis now plays an essential role, have driven the design and construction of gas ships, with a wide variety of containment systems, supply modes (STS, TTS, etc.), engines, ship types, etc. All of this comes together to form a "greener" way to operate ships.

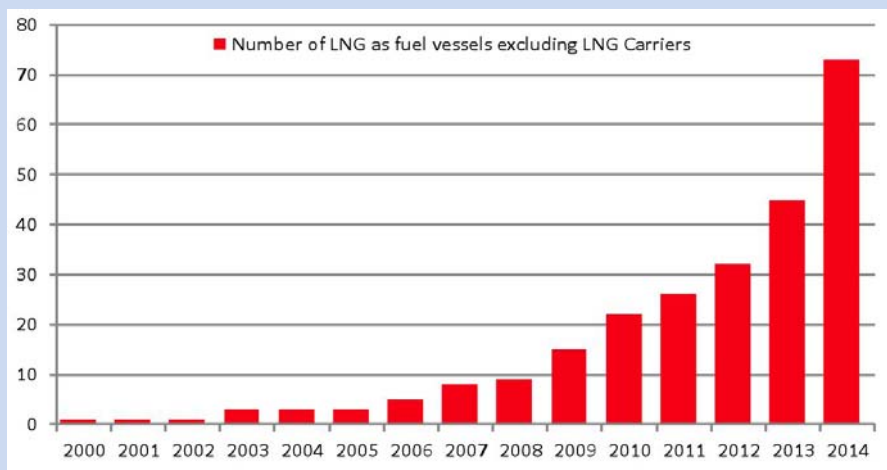
- The third such issue, yet to be resolved, is in the field of training for crews and the supply itself. Handling a gas at cryogenic temperatures/high pressure entails high risk for the crew and the ship. Regulation of supply systems is being brought up to date, incorporating proposals made by different countries in order to harmonize rules for all countries, whether the supply is from the terminal, tanker truck or ship. Specific standards have been generated in different countries by governmental or nongovernmental organizations, but there

Figure 1



are also many internationally recognized standards, among which it is worth highlighting the draft proposed by IACS (International Association of Classification Societies). With respect to training, there are as yet no officially certified courses, but we expect to shortly start seeing requests regarding this important issue.

In conclusion, LNG is already a reality in the global maritime industry, and although it is still an emerging market, the market has undeniably grown exponentially (despite the price of oil), indicating one of the highest potentials for growth in the global shipping sector.



PROJECTS

Fundación Valenciaport takes part in the first STM Validation workshop in Brussels

On 9th, 10th and 11th March, the first workshop for the STM Validation project took place in Brussels. This initiative is co-funded via the CEF (Connecting Europe Facility) innovation programme and is coordinated by the Swedish Maritime Administration with the participation of Fundación Valenciaport as project partner.

The STM Validation project follows on from the MONALISA 2.0 project, which defined the bases for the Sea Traffic Management model. The STM concept aims to modernize the current sea traffic management model, incorporating new technologies for information exchange



Some of those taking part in the STM Validation workshop in Brussels

and sharing, which subsequently boost the efficiency of port-maritime operations, reduce environmental impact and improve security levels.

Fundación Valenciaport is participating in Activity 1 (Port Collaborative Decision Making, PortCDM) as the coordinator of a pilot project which involves the

Mediterranean ports of Valencia, Barcelona, Genoa, Civitavecchia, Naples and Limassol. PortCDM aims to improve the efficiency of approach and docking operations of ships in European ports, under the premise of facilitating just-in-time operations.

In addition, Fundación Valenciaport is coordinating Activity 5 which deals with the analysis and evaluation of the project results, taking on responsibility for studies that demonstrate the economic, environmental and security improvements generated by implementing the solutions proposed by STM.

Fundación Valenciaport analyses the current state of the information systems of organizations involved in foreign trade in Chile



Fundación Valenciaport has started work on a situation analysis of all information systems and procedures involved in Chilean foreign trade.

The rationale behind this project, funded by Chile's Ministry of Transport and Telecommunications, is to identify ways to improve the control and coordination of access of goods to ports and common areas. There are currently a number of

problems regarding coordination among stakeholders as well as unfamiliarity with the requirements for the export and import of goods. This project will help identify the necessary data exchange standards in order to ensure interoperability between the different players in the foreign trade process. This will take place within the environment of a Port Community System, and with a high degree of information security and transparency.

This study, which began in mid-February and ends in mid-August, will include:

- Analysis of different international and

national experiences in communication systems;

- Identification of international data transmission standards in trade;
- Description of the electronic exchange of information systems for the transaction, management and coordination of foreign trade activities in Chile;
- Definition of a data privacy model;
- Proposed design and adaptation of regulations for managing data and mapping out a project plan for the implementation of the proposed improvements.

Success of the international LNG conference organized as part of the GAINN projects



The international conference “LNG as Marine Fuel: the Moment of Truth” was held on 16th March and received an enthusiastic reception from attendees. It was organized by the Fundació Valenciaport within the framework of the GAINN projects, financed by the European Commission through its Connecting Europe Facility (CEF) Programme.

During the opening session of the conference, Ramón Gómez-Ferrer, Director of Strategic Planning for the Port Authority of Valencia (PAV), reiterated the support of the Port of Valencia for these types of initiatives that would enable the Valencia enclave to play a pioneering role in the use of Liquid Natural Gas (LNG) in the Mediterranean. In addition, Fundació Valenciaport’s Director of Projects, Antonio Torregrosa, gave a presentation of the GAINN projects, drawing attention to the essential role that they will play in reducing emissions in European maritime transport. Lastly, Rafael Rodríguez, Director General of the General Directorate of the Merchant Navy gave a speech about the Spanish maritime strategy regarding the implementation of LNG as a marine fuel.

This was then followed by the first session under the heading “Pioneers in the use of LNG”, chaired by Carlos Rodríguez, Director of HSE and QA at Boluda Corporación Marítima. During the session, there was an overview of the main arguments as to why European ship owners should make the move to LNG. Particular mention was made of compliance with Annex VI of the MARPOL Convention, in addition to the savings in operating costs.



From left to right: Rafael Rodríguez, Ramón Gómez-Ferrer and Antonio Torregrosa



The many conference attendees

This was immediately followed by a round-table session about technical solutions currently available in the market, chaired by Mercedes de Juan, Fundació Valenciaport’s Head of R&D&I Projects, and Technical Coordinator for the GAINN projects. Taking part in the debate were representatives of MAK, MAN, WÄRTSILA and Rolls-Royce.

The second session, chaired by Jaime Pancorbo, Technical Director of Bureau Veritas Spain & Portugal, consisted of a presentation about innovative technical solutions that would enable a greater autonomy for LNG-powered vessels and dealt with its suitability with CNG (compressed natural gas) and LPG (liquid petroleum gas).

The third session, chaired by Manuel Lage, General Secretary for GASNAM, discussed how best to optimize the LNG logistics chain. The major players from the Spanish gas system analysed the associated distribution costs of LNG and its impact on the final price. There was also an analysis of the gas supply systems for islands, examining the virtual gas pipeline model for Madeira (Portugal).

The small-scale distribution model was the topic dealt with during the fourth session, chaired by the Director of Business Development for Molgas, Ángel Crespo. One of the advantages highlighted was the reduction in both logistics and storage costs.

The fifth and final session dealt with the different approaches to increase demand for LNG, guaranteeing as such the economic efficiency of the supply facilities. During the session, chaired by Rui Lopes, Port Security Officer and Director of the APRAM Heliport - Ports of Madeira Port Authority, examined the potential use of LNG, not only as a marine

fuel, but also as a fuel for trucks, heavy machinery, and as a way to generate power for other land-based applications. The closing session included speeches by José Anselmo, Chief Executive of the DG-MOVE Trans-European Transport Networks; Vicente del Río, CEO of the Fundació Valenciaport and Francesc Sánchez, CEO of the PAV.

GAINN PROJECTS:

The GAINN projects (GAINN4MOS and GAINN4SHIP INNOVATION) share the common aim of producing results that provide support to European Union (EU) member state legislators as well as to port authorities and shipowners operating in several European Mediterranean countries and Portugal, helping them to comply with environmental regulations in the most efficient way possible.

The GAINN projects will include actions focused on analysing and identifying the best option that would allow ports to provide LNG supply services, as well as actions aimed at designing and building such supply facilities. The projects also include engineering studies on adapting ships to reduce their emissions to the desired level, pilot tests to retrofit and improve various types of vessels, and actions addressing the installation of scrubbers in addition to retrofitting or building new boats that comply with this regulatory framework.

The GAINN projects will promote sea and land transport that is greener, more secure and more sustainable. They will do so by reducing operating costs associated with fuel consumption by 30%, through prototype retrofits of the ships forming part of the projects. They will also reduce greenhouse gases emissions by about 20% and sulphur emissions by 80%.

Fundación Valenciaport takes part in the annual ICHCA conference

From 29th February to 3rd March, the annual conference of the International Cargo Handling and Coordination Association (ICHCA) took place in Barcelona. Key players in the port industry came together with the aim of improving security and efficiency aspects of port operations within the present day context of increasing traffic and cargo volumes.

As part of this conference, Fundación Valenciaport and Noatum participated in the Expert Panel on Security (ISP75). Representatives from the two organizations gave presentations on, respectively, innovation in energy efficiency and security.

Fundación Valenciaport's José Andrés Giménez presented the results of the SEA TERMINALS project, co-funded by the European CEF programme (Trans-European Transport Network), including the successful completion of several pilot projects on port machinery powered by



José Andrés Giménez delivering his presentation



Jorge Martín delivering his presentation

low-emission technologies (electric hybridization and alternative fuels).

For his part, Jorge Martín Díaz de Espada of the Noatum group, introduced a new security centre installed in one of the group's terminals, which uses remote monitoring systems which allow continuous security control that is more efficient and cheaper than the current solutions.

TRAINING

Fundación Valenciaport and SERVEF meet to discuss training issues related to the port-logistics sector

On 1st March a meeting was held between representatives of the Valencian Employment and Training Service (SERVEF) and Fundación Valenciaport. From SERVEF, Juan Angel Poyatos León, Director General of Planning and Services, and Rosa Lopez, Deputy Director General of Vocational Training for Employment, met with Fundación Valenciaport's Pilar Blaya, Head of CSR, and Ana Rumbeu, Head of Training, to discuss various issues related to training in the port-logistics sector and which may offer possibilities for collaboration between the two organizations.

There was a particular focus on the "Jobs On-board" project, which Fundación Valenciaport has been promoting for some time and which aims to convert the Valencian region into a training "hub" for people who want to work aboard cruise ships. A crucial element of this project is to include unemployed youth, channelled through via SERVEF, thus offering them a profession in which to develop.

Central to the conversation were also professional certificates that are not well-suited to the transport, logistics and ports

AGENDA

■ May 2016

Start of the online course "Energy Operators in the Port Environment"

■ 6 May 2016

MEDUSA International Conference "Cyber-Security in the Supply Chain: New approaches and challenges"
More information and Registration form: <http://www.fundacion.valenciaport.com/Schedule-news/Schedule/MEDUSA-Conference.aspx>

■ 21 May 2016

Start of Legal workshop. The Shipping Act.
Dates: 21, 27 and 28 May.

■ Coming Soon

- Course on Customs Code in the EU
- Course on cargo lashing and stowage, and weighing certificate (changes to the SOLAS Convention).

More information on Courses:

Tel.: 96 393 94 00 (M^a Carmen Estela)
formacion@fundacion.valenciaport.com



Meeting participants

sector, as well as the adaptation of existing vocational training to the sector's real needs.

The possible synergies between Fundación Valenciaport and SERVEF with respect to the sector's training needs will be crucial to the success of many of these actions.