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SIGTTO

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SIGTTO NEWS

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Autumn 2021

MESSAGE FROM GENERAL MANAGER



Face-to-face works best

Secretariat staff are back in the office after 18 months of working from home, and enjoying the benefits, as SIGTTO General Manager Andrew Clifton explains

The signs are hopeful that we are emerging from the pandemic stage of the COVID-19 virus and our first thoughts at this time are with those who have lost loved ones. As the indications of a return to some semblance of normality gather strength, we can also take stock of where we, as an industry body for the gas shipping and terminal industry, stand.

Two very welcome events for the Society occurred during the month of October 2021. As has been the case with most organisations like ours, the SIGTTO Secretariat has been working remotely since mid-March of last year and our technical work has continued uninterrupted through remote working group meetings. However, with the recent relaxation of COVID restrictions here in the UK and, after completion of an extensive risk assessment in tandem with the implementation of many additional control measures, SIGTTO was able to re-open its London liaison office on 4 October.

After 18 months of remote team meetings it has been most refreshing, on our return to the workplace, to meet and interact with fellow staff members on a face-to-face basis. Despite the wonders of virtual communications it is still much easier to get things done and to communicate in the 'real' world. At another level it is a great boon to be able to welcome members and other visitors to our office where social



Being seen to be clean will not be enough for gas carrier engine rooms in future; they will need to prove their fuel efficiency performance

"The number of Secretariat staff is poised to reach 11, the highest in the Society's history."

exchanges and business discussions are more relaxed, extensive and rewarding.

I was also pleased to be able speak in person to delegates who had gathered at a London venue for a symposium organised by the Western Europe branch of the US-based Society of Naval Architects and Marine Engineers (SNAME) on 8 October. It was the first time I had been able to address an audience on a face-to-face basis since the onset of COVID.

The second positive piece of recent SIGTTO news is that we have welcomed two new additions to our Secretariat since the Spring 2021 edition of this newsletter was published. Mariah Abshire joined us as Technical Publishing Assistant during the summer while at

the beginning of October Adrian Ruiz became our latest recruit. Appointed as Technical Adviser, Adrian replaced Alex Hammond, who had been with us on secondment from Shell and had departed the Secretariat at the end of April 2021.

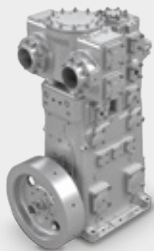
At SIGTTO's Spring Board meeting, >

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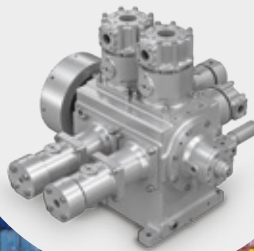
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MESSAGE FROM GENERAL MANAGER

which was held virtually on 26 May 2021, the Society's 2020 finances and audit were discussed and signed off; the current finances were discussed; and the draft 2022 budget was submitted. The COVID-19 impact and mitigations were also discussed at length and updates were presented on the work of our General Purposes and Human Element Committees and the marketing initiatives that SIGTTO has underway.

In addition to the appointment of Adrian Ruiz the Board approved the recruitment of one further Technical Adviser. While the appointee will be available to help meet the needs and expectations of SIGTTO's membership across the board, a special focus for the additional Technical Adviser will be the various environmental initiatives upon which the shipping industry is embarked at IMO.

At IMO SIGTTO has traditionally been involved mainly with the work of that UN agency's Maritime Safety Committee (MSC). However, the agenda of the Marine Environment Protection Committee (MEPC), IMO's second principal body, is taking on increasing significance due to pressures being placed on the global shipping industry to improve fuel efficiency and reduce atmospheric pollution. SIGTTO's workload has never been as high as at present and our Board recognises the clear need for increased resources. The new environmental specialist Technical Adviser appointment, to be announced shortly, will boost the number of personnel in our Secretariat to 11, the highest in the Society's history.

SIGTTO remains the provider of best practice guidance and recommendations to the gas shipping and terminal industry and we are pleased to report that we were able to continue to fulfil this role and remain open for business throughout the pandemic. A prime example of this ongoing commitment is the Society's latest set of guidelines, *Recommendations for Cargo Control Room HMI*. This human/machine interface document was approved at the Spring Board and further details of the publication can be found on page 14.

I would like to thank my hard-working Secretariat who have maintained impressive productivity levels over the past 18 months, despite the obstructions thrown up by the COVID pandemic. Our various committees, too, deserve full credit for keeping on top of what has been an increasing workload in difficult circumstances. The bodies in question are the General Purposes Committee (GPC) chaired by Mark Hodgson of Shell, the Human Element Committee (HEC) chaired by Steve Allibone of MOL and the new Environmental Sub-committee (ESC) chaired by John Boreman of BP.



SIGTTO is looking forward to the return of face-to-face Panel Meetings, starting with the Athens event in March 2022, the 65th in the series

Mark Hodgson has now stepped down as GPC chair and we would like to thank him for his services to the Society over many years, not least for his effective and productive guidance of GPC's growing portfolio of activities. A successor to Mark as GPC chair will be appointed shortly and announced in the Spring 2022 edition of *SIGTTO News*.

Pre-COVID a large part of SIGTTO's engagement with its membership was through face-to-face encounters at various of the Society's regular gatherings such as Regional Forums, Panel Meetings and the technical committee sessions. We are pleased to announce an imminent return to this traditional way of doing business. The Autumn Board and Annual General Meeting (AGM) on 18 November 2021 are planned as in-person events in Athens and will be kindly hosted by Naftomar. This will be not only SIGTTO's first face-to-face meeting since early 2020 but also the first time I'll have been on a plane since early last year!

We are also confident that our next Panel Meeting, also in Athens and scheduled for the end of March 2022, will go ahead as an in-person event as planned. Set to be the largest face-to-face gathering of SIGTTO members in three years, this is one for your calendars! Details of this and the other future SIGTTO meetings scheduled to date can be found on pages 9 and 13.

We are also hopeful that our regular Regional Forums and other meetings can resume on their usual in-person basis in the near future. Although we will not schedule any such meetings until the situations in various parts of the world become clearer, they can be arranged at fairly short notice.

The gas shipping industry continues to deal with the repercussions of the COVID virus and the climate change debate. The repercussions, which include worldwide gas shortages, skills shortages, the drive for

decarbonisation and specific IMO initiatives like the recent Energy Efficiency Existing Ship Index (EEXI), will no doubt bring changes. While some of the changes will be short-term in nature and others more long-term, several are likely to be quite dramatic.

As a result of the push for decarbonisation LNG ship operators will need to look beyond immediate compliance with the Energy Efficiency Design Index (EEDI) and EEXI measures developed by IMO's MEPC and be prepared for the Carbon Intensity Indicator (CII) reductions lying ahead to ensure that their highly technical vessels are verified as being operated efficiently.

Another fresh challenge for the gas shipping industry is the development of new breeds of gas ship – in particular liquefied hydrogen and carbon dioxide (CO₂) carriers – to assist in the push for a zero-emissions future. Hydrogen is regarded as the ultimate clean fuel while CO₂ ships will form an essential part of any carbon capture and storage (CCS) project supply chain that is developed. Yet the design of gas ships able to carry economic volumes of either hydrogen or CO₂ safely and efficiently constitutes a demanding task for naval architects and engineers.

While it is an unprecedented and exciting time to be involved in our industry, it is essential that we take collective responsibility for the new technologies we are being called on to develop in order to safeguard the exemplary safety record that we have built up over the last six decades.

Finally, on a personal note, I was most honoured to have been made a younger brethren of Trinity House recently. To be part of this famous organisation, which has been dedicated to safeguarding shipping and seafarers since receiving its Royal Charter in 1514 and which has Princess Anne as its patron, is a great privilege.



The revision of the Jetty Maintenance and Inspection Guide is a joint project being carried out in tandem with the Oil Companies International Marine Forum (OCIMF)

The following paragraphs provide updates of progress being made by currently active working groups and sub-committees established under the auspices of the SIGTTO General Purposes Committee (GPC).

Design and Operation of Liquefied Gas Terminals

This working group, chaired by Guy Nicholls of Cheniere, is combining two existing SIGTTO documents, *Site Selection and Design for LNG Ports and Jetties* (1997) and *LNG Operations in Port Areas – Essential Best Practices for the Industry* (2003). The single revised document will use a risk-based approach and consider technical advances made and lessons learnt from incidents since the original documents were published. The working group has met three times so far and continues to develop the draft document.

Gas Carrier Propulsion Systems

This working group, chaired by Philip Ryan of BP, continues to work on an initial draft document on environmental and operational issues associated with gas carrier propulsion systems. The document deals with *The International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk* (IGC Code), the Energy Efficiency Design Index (EEDI), the Energy Efficiency Existing

Ship Index (EEXI) and lessons learnt from incidents. All topics included in this draft will be used to align future revisions to the appropriate IGC Code chapters.

Gas Carrier Reliquefaction Systems

Also chaired by Philip Ryan of BP, this working group is producing a document on the safety, environmental and operational issues associated with gas carrier reliquefaction systems. Like the Gas Carrier Propulsion Systems working group, it will cover the IGC Code, EEDI, EEXI and incident lessons. All topics included in this draft will be used to align future revisions to the appropriate IGC Code chapters.

Gas Carrier Salvage

This working group, chaired by Ian Wolfarth of Chevron, continues to make good progress and initial content has been received to produce the first draft. The draft will cover potential salvage situations on gas carriers, with the primary focus on prevention and emergency preparedness.

The Selection and Testing of Valves for LNG/LPG Applications

Chaired by John Taylor of Shell, this working group is combining two existing SIGTTO documents, *The Selection and Testing of Valves for LNG Applications* (2008) and *The Selection and Testing of Valves for LPG Applications* (2012),

into a single revised publication. The working group has met twice so far and is compiling an initial first draft.

Guide for Planning Gas Trials for LNG Vessels

This working group, chaired by Rose Brooks of BP, is working to revise the existing SIGTTO publication *Guide for Planning Gas Trials for LNG Vessels* (2008). The updated version will take into account recent technology advances, including Type A and large Type C cargo containment system developments. The reduction of greenhouse gas (GHG) emissions from gas trials is also being considered.

The working group has held two meetings so far, most recently in September 2021, and is reviewing the first draft.

Gas Concentrations in the Insulation Spaces of Membrane Gas Carriers

This new working group will revise *Gas Concentrations in the Insulation Spaces of Membrane LNG Carriers* (2007). The group will begin work shortly and the revision will recognise new reference material and environmental considerations.

Gas Carrier CO₂ Emissions

Chaired by John Taylor of Shell, this working group aims to identify all distinct processes that generate CO₂ emissions on board gas carriers and outline guidance to assist standardisation of reporting methodology.

The working group has held three meetings so far, most recently in October 2021.

The working group submitted a concept draft to the GPC for comment in October 2021 and aims to submit a final draft to GPC 84 for approval in March 2022.

This group will work in collaboration with a separate group, the Reduction of Gas Carrier CO₂ Emissions Working Group, which is set to begin work.

LNGC Fugitive Methane Emissions

This working group, chaired by Ajay Edakkara of Shell, aims to identify all distinct equipment and systems that could generate fugitive methane (CH₄) emissions on board LNGCs; consider best practice measurement and monitoring functions; and outline guidance to assist with the standardisation of reporting methodology.

The working group has held three meetings so far, most recently in October 2021. The working group submitted a concept draft to the GPC for comment in October 2021 and aims to submit a final draft to GPC 84 for approval in March 2022.

The LNGC Fugitive Methane



Emissions Working Group will work in collaboration with a separate group, the Reduction of LNGC Fugitive Methane Emissions Working Group, which is set to begin work.

Jetty Maintenance and Inspection Guide (OCIMF/SIGTTO)

This working group has been established by the Oil Companies International Marine Forum (OCIMF) to lead the revision of *Jetty Maintenance and Inspection Guide (2008)*, a document that it produced jointly with SIGTTO.

SIGTTO Principal Technical Adviser Rob Farmer is acting as liaison with this working group and is assisting in aligning it with SIGTTO publications. The working group has held four meetings so far, most recently in August 2021. SIGTTO’s GPC will review and comment on the revised document prior to approval.

Environmental Sub-committee

Chaired by John Boreman of BP, the Environmental Sub-committee is comprised of GPC members representing BP, Cheniere, Chevron, Enagas, ExxonMobil, Maran Gas, Shell and TotalEnergies.

The Sub-committee has held five meetings so far, most recently in September 2021. Progress updates were provided on the four Environmental Sub-committee initiated working groups on CO₂ and fugitive methane emissions. Current work items at the IMO were also reviewed and discussed, most notably EEXI and CII. A preliminary discussion on safe CO₂ shipping was held prior to bringing this new work item forward to the GPC for consideration.

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HUMAN ELEMENT COMMITTEE: WORKING GROUPS



The new, revised edition of the *LPG Shipping Suggested Competency Standards* document will include coverage of the use of LPG as marine fuel

The following paragraphs provide updates of progress being made by currently active SIGTTO Human Element Committee (HEC) working groups.

LPG Shipping Suggested Competency Standards

This working group is revising and updating *LPG Shipping Suggested Competency Standards (2008)*. Chaired by Steve Allibone of MOL, the revision focuses on how working practices and competencies have been affected by changes in the industry, new technologies and improvements in safety, as well as lessons learnt from past incidents. A major addition to this revision is coverage of the use of LPG as a fuel. The working group is in the final stages of document preparation and a final draft will be submitted to 12th meeting of the Human Element Committee (HEC 12) for approval in January 2022.

Shore Staff Competency Management System Standards

Chaired by Jo McDade of Chevron, this working group continues to gather and refine information associated with suggested best practices. The aim is to identify and develop components of a competence management system for shore staff that adds to a company’s human factor toolkit. The working group submitted a framing document for comment in July 2021 and will submit a final draft to HEC 13 for approval in July 2022.

Cargo Resource Management

This working group, chaired by Steve Allibone of MOL, is developing a document on a model gas cargo resource management training course. The group has held three meetings, most recently in July, and is working to compile a first draft.

Suggested Quality Standards for LNG Training Providers

This new working group, chaired by Ray Gillett of GTT Training, is working to revise *Suggested Quality Standards for LNG Training Providers (2014)* to consider technical improvements that have been made and lessons learnt from incidents since the original document was published. The terms of reference (TOR) for this project were approved in January 2021 and the working group has compiled a first draft.



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Adrian Ruiz augments Technical Adviser team



Adrian Ruiz, a native of Spain, is the latest in a long line of SIGTTO Technical Advisers. He joined the Society on 4 October 2021, the same day that Secretariat staff reconvened at the London liaison office after working from home for 18 months during the COVID pandemic.

Adrian received his bachelor and master of science degrees in marine engineering from universities in Spain

and early on, as part of his experience development programme, worked onboard an LPG carrier as an engine room cadet. Post-university work included the aeronautic testing of turbines and two years as a validation engineer in the wind turbine manufacturing sector.

Adrian Ruiz spent nine years with DNV GL (now DNV), working in the classification society's Aberdeen and London offices on major offshore oil and gas industry projects. His responsibilities as a senior engineer and project manager ranged from executing the technical scope of the projects through to planning, budget control and decision-making with respect to the associated safety cases, applicable regulations and class rules. Adrian joins SIGTTO from ProHeat Systems, a manufacturer of indirect gas-fired heaters, where he was mechanical lead engineer as well as compliance and project manager.

"I am very excited to be joining SIGTTO and look forward to contributing to the Society's goals and meeting its members' needs," states Adrian. "I have experience of offshore oil and gas safety cases, the CE marking of products approved for use in the European Union and the work of class societies, and believe that the application of some of this knowledge can be of use in SIGTTO's work. I look forward to being involved in tackling the ongoing challenges we are facing in the gas shipping industry, from climate change and decarbonisation to safeguarding life and property."

Mariah Abshire joins publications department



Mariah Abshire has joined the SIGTTO Secretariat as Technical Publishing Assistant. Mariah completed her degree in

English literature and communications studies at Hollins University in the US state of Virginia in 2019 and is looking forward to expanding her editorial skills through work on SIGTTO's growing portfolio of industry best practice publications. She will be assisting Laura Else, SIGTTO's Technical Publishing Manager

"In addition to the media and writing coursework entailed in my studies, I spent a considerable amount of extracurricular time on university magazines, reviewing and publishing peers' writing," comments Mariah. "I also served as a writing tutor for undergraduate and graduate students, work which included editing a variety of their output, from art history essays to biology dissertations. These past experiences should stand me in good stead in reviewing and editing the technical content that SIGTTO working groups collect for publications."

Fred Venner - powerful advocate for LNG



SIGTTO is sad to report the death of Fred Venner over the weekend of 23/24 October. Fred was a strong

supporter of the Society throughout his long career, as both a member of the General Purposes Committee (GPC) for many years and a regular attendee at and contributor to Panel Meetings. Fred was also a great character with strong views, honed on years of experience with the gas shipping industry. Always good company, he

was well liked by everyone he met.

Chris Clucas, a fellow former GPC member, writes: "Fred had a great early career as an engineer, including on P&O's *LNG Challenger* as a second and then as the chief on the 1969-built *David Gas* with Atlantic Marine. His recall of the machinery on the latter ship was encyclopaedic!

"Latterly with Bureau Veritas (BV) and E.ON/Uniper, Fred was a powerful advocate for the LNG sector. We will really miss him."

A Tyneside native, Fred qualified as a marine engineer at South Shields Marine & Technical College in 1980. After his seagoing career he spent four years with Kuwait Oil Tanker Co as a fleet superintendent before moving on to BV in 1990. Fred Venner was with the classification society for 18 years, latterly as manager tankers & gas carriers in Paris.

At one point, in the mid-1990s, he was seconded by Abu Dhabi National

Oil Company to help supervise the construction of four 135,000 m³ spherical tank LNG carrier newbuildings at the Masa Yards' Turku facility in Finland. Amongst the society's many notable achievements in the gas shipping field, BV classed the first LNGCs to be powered by dual-fuel diesel-electric (DFDE) propulsion systems, in the early 2000s, and Fred was closely involved with that project.

Fred completed his gas shipping career with the E.ON in Germany, joining the group as vice president LNG marine operations, first with E.ON Ruhrgas AG and then E.ON New Build & Technology GmbH. Latterly he returned to his beloved Tyneside and served as a consultant for Uniper, the new company established in 2016 to carry on E.ON's LNG activities.

SIGTTO members would like to extend their condolences to Fred's family and to express their appreciation of all that he has done for our industry.

The harmonised GC Code developed by a wide cross section of industry experts was a key foundation stone for the exemplary safety record established by gas shipping over the past 50 years



A regulatory regime for all seasons

Celebrating 50 years since industry began work on the first gas carrier code

News that the International Maritime Organization (IMO) has called for a further review and update of the *International Code for the Construction and Equipment of Ships Carrying Liquefied gases in Bulk* (IGC Code), only five years after the previous revised edition entered into force, gives a good indication of the rapid pace of technological advance currently characterising the carriage of liquefied gases by sea. The challenges faced by the developers of the first-ever gas carrier code, work on which began exactly 50 years ago, were of an entirely different nature. They had to start more or less from scratch.

Fifty years ago the maritime transport of LNG was at a very early stage of development. Three ships carried the product from Algeria to the UK and France and two ships transported Alaskan LNG to Japan. In addition, during 1971 Spain and Italy began importing Libyan LNG using a fleet of four carriers while a single ship was used to commence the carriage of Algerian gas to Boston. On top of these 10 existing vessels (all under 50,000 m³ in size), the first ships in the fleets earmarked

for the carriage of Brunei LNG to Japan and Algerian LNG to the US had been ordered. Although the first purpose-built, LPG-only gas carrier had been in service since 1953, the LPG fleet was also still relatively limited in size and comprised primarily of small, simple, fully pressurised vessels.

The gas shipping industry at the time was aware that the LNG and LPG fleets were poised for worldwide growth and that the design, construction and equipment of such vessels would benefit from a harmonised set of international regulations to replace the handful of often incompatible national standards then available. This was especially so, as a plethora of new cargo containment systems had been proposed for the larger ships that would be needed for the expected growth in the liquefied gas trades.

Against this background, the Subcommittee on Ship Design and Equipment of the Inter-Governmental Maritime Consultative Organization (IMCO, renamed IMO in 1982) held the first meeting of a new ad hoc working group on gas carriers in September 1971. The group comprised representatives from fifteen countries and four industry associations and was chaired by Robert J (Bob) Lakey, chief scientific advisor to the US Coast Guard (USCG). While the working group was new, in many ways it was a continuation of the earlier efforts of another IMCO group focusing on chemical tankers, also a relatively new type of ship at the time. That body's work resulted in what was to become

the *International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* (IBC Code).

The initial focus of the gas group members was on harmonised industry definitions, applicable ship types, provisions for acceptable containment systems and a mechanism for the revision of any code that was drawn up. The outreach of the gas code founding fathers extended well beyond the IMCO ad hoc group members as each national administration established its own domestic task force to enable expertise from many different disciplines to be tabled.

The ad hoc gas group carried out its painstaking and detailed work for almost four years and progress was monitored and disseminated through task force and national administration communications and conference presentations. In this way, the potential for input into the debate on the document's contents was extended even further.

In his book *Natural Gas by Sea* Roger Ffooks pointed out that the International Association of Classification Societies (IACS) played a key role in the establishment of the first gas carrier code. The formative rules of several individual class societies had guided the construction of the pioneering gas carriers but the USCG said that it would be unable to accept the chapters on cargo containment (Chapter IV), cargo handling (V) and materials of construction (VI) that had been drafted for the new code unless they were agreed

to by all the major class societies.

The USCG's stance called for the IACS members to sit down and develop a common approach for the multitude of items on which they had previously disagreed. However, as Chris Clucas, an ad hoc group participant as part of the International Chamber of Shipping's delegation, points out, this was easier said than done as there was an innate reluctance amongst the major class societies at the time to pool their individual expertise built up over the years. Matters came to a head at an intersessional meeting at Sopot in Poland when Bob Lakey and his USCG colleagues intimated that if the class societies did not cooperate to produce a combined document, the US Coast Guard would do it for them. This had the desired effect, the IACS members sitting down to produce one of the first sets of "unified standards" for which they were to become renowned.

Incidentally, Chris Clucas, who all *SIGTTO News* readers will know well, was freshly graduated in chemistry from Sheffield University when nominated to be part of the ICS delegation to the ad hoc gas group. In an article in 2019's *SIGTTO at 40 Years* anniversary publication Chris describes how he was "smitten by liquefied gas shipping" as a result of that appointment. SIGTTO and the industry at large have great cause to give thanks for that moment of enlightenment and the contributions he has made to gas shipping safety over the past 50 years.

Chris also confirms the nascent state of the industry back in 1971. "When the IMCO gas ship group started its work, all the LNG carrier crews around the world literally knew each other by name," he reports, "as they had all studied together and compared experiences. LNG really had a 'family' atmosphere at the time."

Bob Lakey was able to report at the Gastech 1974 meeting that his ad hoc group had more or less finalised the new IMCO gas carrier code at its latest meeting, held in Hamburg three weeks earlier, in October 1974. In November 1975, at IMCO's Ninth Assembly, the *Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk* (GC Code) was adopted, with a recommendation that governments incorporate its contents into national regulations as soon as possible. The take-up was quick and the GC Code became applicable for all gas carriers constructed after 31 October 1976.

The first vessel to fully comply with the provisions of the GC Code was the fully pressurised 1,600 m³ LPG carrier *Anna Tholstrup*, delivered to Kosan Tankers of Copenhagen in early 1976. This was very



Source: Natural Gas by Sea by Roger Ffooks

Members of the ad hoc working group that drafted the GC Code in the early 1970s; Bob Lakey is shown in the front, seated row, fourth from the left

appropriate as Kosan had built that first LPG-only carrier in 1953 and its managing director, Knud Jensen, had been an influential member of the ad hoc gas group.

The GC Code took into account the new technologies under development at the time of its compilation and the ad hoc working group members recognised that the then-existing and under construction gas carriers would be unable to meet all the new document's requirements. To remedy the situation, within 12 months of the GC Code appearing the *Code for Existing Ships Carrying Liquefied Gases in Bulk* (EGC Code) was produced. The contents and format of the GC and EGC Codes were closely aligned.

A 1986 revision of the GC Code was renamed the *International Code for the Construction and Equipment of Ships Carrying Liquefied gases in Bulk* (IGC Code) and this is the Code which is now kept under

review to take into account experience gained and technological developments.

The latest version of the IGC Code, incorporating comprehensive amendments, entered into force in July 2016. The revision work was carried out by an industry group coordinated by SIGTTO. This was the first time that IMO had entrusted industry to revise one of its instruments and the project benefitted from the presence of a small number of experts who had participated in Bob Lakey's original ad hoc group!

The Society's members will once again have a key role to play on the next revision of the IGC Code, a project sanctioned by IMO earlier in 2021. The original ad hoc gas group recognised the importance of keeping the body of regulations up to date and the ongoing revision work reflects the original principles set down by the groups' founding fathers half a century ago.

UPCOMING MEETINGS 2021	DATE	LOCATION
Autumn Board/Annual General Meetings	18 Nov	Athens

UPCOMING MEETINGS 2022	DATE	LOCATION
12 th Human Element Committee	20 Jan	London
84 th General Purposes Committee	29 Mar	Athens
65 th SIGTTO Panel Meeting	30-31 Mar	Athens
Spring Board Meeting	12 May	London
13 th Human Element Committee	7 July	London
85 th General Purposes Committee	4 Oct	TBC
Autumn Board/Annual General Meetings	16 Nov	TBC

*** Locations assume an end to all COVID restrictions and that travel arrangements, etc are back to normal. It is planned to resume a regular schedule of Regional Forums once the COVID situation at the various locations is determined to be suitable.**

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The Bahamas LNG fleet now boasts over 94 registered vessels representing 13% of the world's ocean-going fleet

The Bahamas Maritime Authority (BMA) is recognised as one of the world's leading ship registries for the LNG / LPG sector, with a proven track record of handling the world's most technically advanced ships.

As ship design has evolved, so has our team. Our knowledge, and understanding, of these high value vessels has positioned us as market leaders.

Our LNG / LPG fleet has gone from strength to strength and now boasts over 124 registered vessels, approximately 5% of the world's ocean-going fleet.

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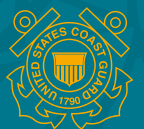
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Seafarers and
Manning



Maritime Affairs



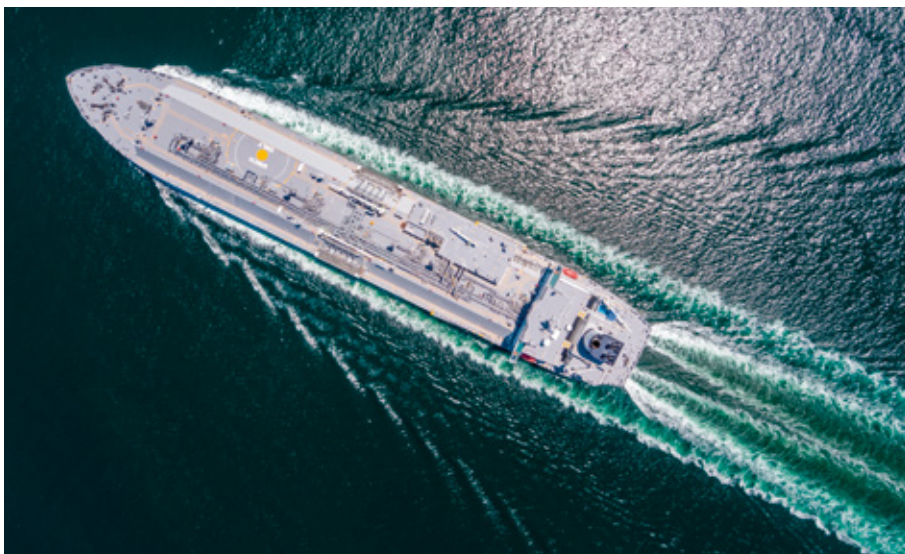
Inspections &
Surveys



Yacht Registration



Investigations



The new IMO regime governing the reduction of greenhouse gas emissions from ships includes measures aimed at achieving continuous, year-by-year performance improvements

Environmental focus intensifies

The following paragraphs detail the most recent decisions impacting gas carriers taken by the International Maritime Organization (IMO). Traditionally, it has been the decisions of IMO's Maritime Safety Committee (MSC) that have had the most impact on gas ship design and operation. However, with the shipping industry in general under increasing pressure to improve fuel efficiency and reduce atmospheric pollution, it is the work of the Marine Environment Protection Committee (MEPC), the second of IMO's two central bodies, that currently is the most important focus for the gas carrier sector.

Maritime Safety Committee

IMO's Maritime Safety Committee met virtually for its 103rd Session (MSC 103) in May 2021. SIGTTO had submitted a paper to the meeting in conjunction with Marshall Islands and the International Association of Classification Societies (IACS) which proposed a focused review of the International Gas Carrier (IGC) Code.

The joint submission was considered at MSC 103 and a new work item on the topic was agreed. It will be added to the agenda for the 8th Session of the Sub-committee on Carriage of Cargoes and Containers (CCC 8), which will be held in September 2022. Although a focused review was proposed, the scope of the review will be unlimited.

When it met for its 104th session in October 2021, MSC adopted a small amendment to the IGC Code on watertight doors (paragraph 2.7.1.1).

Marine Environment Protection Committee

IMO's Marine Environment Protection Committee met virtually for its 76th Session (MEPC 76) in June 2021. The cut-down agenda mainly focused on measures for the reduction of greenhouse gases (GHGs) including the Energy Efficiency Existing Ship Index (EEXI) and Carbon Intensity Indicator (CII).

EEXI and CII Amendments to Annex VI of the Marine Pollution (MARPOL) Convention introducing regulations covering EEXI and CII, previously approved at MEPC 75, were adopted at MEPC 76. The amendments will enter into force on 1 November 2022 and be implemented from 1 January 2023.

The EEXI is a technical measure of the ship's energy efficiency based on the Energy Efficiency Design Index (EEDI) but applied to existing ships. The EEXI reduction factor for LNG carriers in the MARPOL Annex VI amendments is 30 per cent from the baseline, while for other gas carriers it is between 0 and 30 per cent, depending on ship size. Verification that the EEXI attained by the ship is in accordance with the requirements is to take place at the first annual, intermediate or renewal survey on or after 1 January 2023.

The CII determines a vessel's operational efficiency and includes an annual reduction factor to ensure continuous improvement of the ship's operational carbon intensity within a specific rating level. The actual annual operational CII achieved will be documented and verified against the required annual operational CII, with 2023 being the first year of data collection. This will enable the operational carbon

intensity rating to be determined.

The CII will be given on a rating scale - A, B, C, D or E - indicating a major superior, minor superior, moderate, minor inferior or inferior performance level. The performance level should be recorded in the ship's Ship Energy Efficiency Management Plan (SEEMP). A ship rated D for three consecutive years or E in any one year would have to submit a corrective action plan, to show how the required index (C or above) would be achieved. The level of required reduction from the 2019 baseline was included in the guidelines and divided into three phases:

- Phase I (2020-2022): 1% per year
- Phase II (2023-2026): 2% per year
- Phase III is not yet decided.

Mid- and long-term measures A work plan for the development of mid- and long-term GHG reduction measures was agreed, consisting of three phases:

- Phase I - Collation and initial consideration of proposals for measures
- Phase II - Assessment and selection of measures(s) to further develop
- Phase III - Development of (a) measure(s) to be finalised within (an) agreed target date(s).

The plan includes provisions for an impact assessment to be conducted in line with IMO procedures. The aim is to complete Phase I by spring 2022 and Phase II by spring 2023. The time to complete the development of a selected measure is not specified and would depend on the complexity and type of measure.

Further work and next steps Before MEPC 77, which will be held from 8 to 12 November 2021, work on GHG measures will continue through a correspondence group and intersession meetings.

Correspondence Group on Carbon Intensity Reduction MEPC 76 agreed to re-establish the Correspondence Group on Carbon Intensity Reduction to consider:

- Updating the Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP), and other related guidelines, such as Procedures for Port State Control
- Developing draft guidelines on correction factors for certain ship types, operational profiles and/or voyages, for the CII calculations (G5), as appropriate.

The correspondence group will submit an interim report to MEPC 77 in November 2021 and a final report to MEPC 78 in 2022.

Intersessional working groups on GHGs MEPC 76 had agreed to establish two intersessional working groups >

(ISWG) to be held before MEPC 77.

ISWG-GHG 9, which met in September 2021, considered:

- Concrete proposals to encourage the uptake of alternative low-carbon and zero-carbon fuels, including the development of lifecycle GHG and carbon intensity guidelines for all relevant types of fuels and incentive schemes, as appropriate
- Concrete proposals to reduce methane slip and emissions of volatile organic compounds (VOCs).

The working group agreed to develop guidelines on the Lifecycle Assessment (LCA) of alternative fuels that will allow a better understanding of the well (or field) to propeller emissions of any given fuel. The issue of methane slip will be further considered in the context of the LCA guidelines. In considering VOC emissions, the group invite interested IMO member states and international organisations to provide more information on technical opportunities to reduce VOCs and will invite MEPC to consider whether the PPR Sub-committee should work on the issue further.

ISWG-GHG 10, meeting in October 2021, will consider:

- Any issues arising from the interim report of the Correspondence Group on Carbon Intensity Reduction
- The scope of and timeline for development of a mandatory carbon intensity code
- Concrete proposals on how to keep the impacts of the short-term measure under review and how to undertake a lessons-learned exercise of the comprehensive impact assessment of the short-term measure
- Mid-term GHG reduction measures in the context of Phase I of the work plan for the development of mid- and long-term measures.

Sub-committee on Carriage of Cargoes and Containers (CCC)

CCC met virtually for its 7th Session (CCC 7) with a cut-down agenda in September 2021. Items agreed by CCC 7 are subject to final approval at MSC 105.

IGC Code UIs: Several proposed IGC Code unified interpretations (UIs) were submitted to this session and one UI clarifying the term “duct” was agreed.

Metallic materials for cryogenic service: The Sub-committee agreed draft amendments to the IGC Code and the International Code of Safety for Ships using Gases or other Low-Flashpoint Fuels (IGF Code) to incorporate provisions for high manganese austenitic steel. These will include the material in the Codes for plates for specific cargoes. Ammonia was not included at this time as further testing was requested.

VIRTUAL PANEL MEETING



IMO Secretary-General Kitack Lim set the scene for the autumn Virtual Panel with an introductory welcome

Keeping the membership posted

SIGTTO held its second Virtual Panel Meeting of 2021 on 5 October 2021. The spring and autumn Virtual Panel Meetings in 2021 were the first-ever such gatherings to be staged using internet links since the Society's long-running series of face-to-face Panels was inaugurated back in the 1980s.

Although lacking the opportunities for conversation offered by the social events at a face-to-face meeting, the Virtual Panels were introduced by the Society as a means of maintaining a high level of communication amongst the membership during a period when travel was not possible.

Despite the severe restrictions imposed in most countries as result of the COVID virus, the movement of liquefied gases by sea has continued more or less unabated. The initiatives launched by SIGTTO working groups have actually increased in number over the past two years while the usual busy schedule of meetings of the IMO committees and sub-committees charged with developing the international regulatory regimes governing maritime safety and environmental protection was undimmed, even though these sessions also took place virtually. Thus, the need for SIGTTO to communicate all the relevant developments to its members has remained as great as ever.

Like the spring event, SIGTTO's autumn Virtual Panel was held using the Swapcard platform, allowing networking and other opportunities, including virtual exhibition stands. The event was recorded and made available to view on demand after the event. There was also an opportunity to ask speakers questions after each presentation.

Proceedings at the autumn Panel were opened with an introductory welcome message to the Society's membership by IMO Secretary-General Kitack Lim. This was followed by 10 topical presentations by the Society's members and invited guests. The following paragraphs describe the highlights from a number of the presentations.

MARPOL Annex VI

Hiroyuki Yamada, director of the IMO Secretariat's Marine Environment Division, described IMO's current wide-ranging decarbonisation efforts, including the regulatory framework for the safe and sustainable use of alternative fuels. The key IMO instrument in this respect is Annex VI of the Marine Pollution (MARPOL) convention governing ship atmospheric pollution and energy efficiency.

Annex VI was adopted in 1997 and has now been ratified by 100 states representing 97 per cent of the world's merchant tonnage. Chapter 3, which regulates atmospheric pollution, contains provisions governing the global sulphur cap and nitrogen oxide (NOx) emissions while Chapter 4, dealing with ship energy efficiency, includes provisions covering greenhouse gas (GHG) emissions.

The new Chapter 3 'IMO2020' global sulphur cap requirements calling for a reduction in the sulphur content of bunker fuel to 0.50 per cent or below from 1 January 2020 were successfully implemented by the world shipping industry. Mr Yamada pointed out that the introduction of these requirements 21 months earlier had resulted in a 77 per cent drop in sulphur oxide (SOx) emissions from international shipping.

IMO's campaign to address climate change through regulatory action to cut GHG emissions from shipping is now a decade old. The first targeted requirements – the Energy Efficiency Design Index (EEDI) and Ship Energy Efficiency Management Plan (SEEMP) provisions - were developed in 2011 and entered into force in 2013. The EEDI regime calls for the introduction of gradually more stringent energy efficiency improvements for newbuild ships in phases. Phase 1 took effect in 2015 and has since been further strengthened. EEDI Phase 2 became effective in January 2020 and Phase 3 will do likewise for certain ship types in April 2022. All other ships will become subject to the EEDI Phase 3 requirements in January 2025.

As the next element in the GHG emissions reduction campaign, fuel consumption data collection regulations were introduced in 2016. Hiroyuki Yamada reported that 111 national administrations collected fuel consumption data from 27,723 ships flying their flags in 2020. The information, including the fact that this fleet had consumed an aggregate 203 million tonnes of bunker fuel, was forwarded on to IMO. The availability of this data will be invaluable in informing IMO's regulatory discussions on reducing the carbon intensity of international shipping.

Emission reduction strategies

As part of the Paris Agreement on Climate Change finalised at the COP21 event in December 2015, the parties agreed that GHG emissions from international aviation and maritime transport should also be regulated as part of the drive by governments to limit global warming. In response in 2018 IMO developed its Initial Strategy on Reducing GHG Emissions from Ships with key goals that included a reduction of carbon dioxide (CO₂) emissions per transport work by at least 40 per cent by 2030 compared to 2008 and a reduction in total annual GHG emissions by at least 50 per cent by 2050 compared to 2008.

In June 2021, at the 76th Session of the Marine Environment Protection Committee, IMO adopted amendments to MARPOL Annex VI aimed at achieving the 2030 carbon intensity reduction goal in its Initial Strategy. IMO terms these short-term measures, covering the period 2018-2023; they include technical provisions in the form of the Energy Efficiency Existing Ship Index (EEXI) and operational requirements through the Carbon Intensity Indicator (CII) initiative. The EEXI and CII provisions enter into force in November 2022 and will be implemented from 1 January 2023. They apply to all ships.

The EEXI regulations call for a one-off assessment of a ship's design energy efficiency performance. If it does not meet the required criteria, the shipowner will need to make technical adjustments on the vessel, such as limiting engine power or using an alternative fuel, to achieve compliance and the necessary certification.

The CII regime calls for an annual reduction in a ship's carbon intensity measured against a ship type/size-specific reference line. The ship's annual carbon intensity performance is to be rated, from A to E. A ship rated D for three consecutive years or E for a single year will be required to develop a plan of corrective actions to achieve an A, B or C rating.

These short-term measures will need to be augmented by mid- and long-term measures if the 2050 goal of a 50 per cent reduction in GHG emissions is to be achieved. The mid-term measures will include new/innovative emission reduction mechanisms, possibly including market-based measures (MBMs), and are tentatively set for implementation over the 2023-2030 period. As for the long-term measures, set for implementation after 2030, IMO, in tandem with industry, will pursue the development and provision of zero-carbon or fossil-free fuels. The mid- and long-term implementation timelines may change as a result of a revision of IMO's Initial GHG Strategy, which is set for publication in 2023.

Hiroyuki Yamada concluded his presentation with a quote from his Secretary-General Kitack Lim on the



The amount of cargo vapour vented will be greatly reduced under GTT's new gas trial procedure

challenging drive for reduced air pollution from ships: "If we all work together, we can ensure that shipping has a truly sustainable, efficient and decarbonised future."

Green gas trials

David Colson, GTT's commercial vice president, reported on the project his company is engaged in with the aim of making the gas trials carried out on LNGC newbuildings prior to delivery more environment-friendly. Gas trials on a completed LNGC consist of testing with LNG all the ship structures and equipment that come into contact with the cargo and its boil-off gas (BOG), including tanks, pumps and engines.

A gas trial encompasses commissioning and decommissioning procedures. Commissioning, the focus of the GTT presentation, involves the gassing up and cooling down of the cargo tanks as well as LNG loading, while decommissioning – involving LNG discharging and the warming up, inerting, aerating and inspection of the tanks – prepares the ship for any final tank entry work at the

yard and handover to the owner.

David Colson told the Virtual Panel delegates that GTT had launched the green gas trials project to achieve reductions in both methane (CH₄) emissions and the quantities of LNG required for gas trials.

Around 270 tonnes of natural gas are vented at sea during the gas trial commissioning process for a 174,000 m³, four-tank newbuilding and the GTT work also anticipates restrictions or a prohibition on such venting in the years ahead. All the gas trial venting occurs at sea, and about 40 tonnes of gas are lost due to the gassing-up procedure, 130 tonnes to cooling down and 100 tonnes due to LNG loading/transfer. Although the ship's low-duty compressor (LDC) and gas combustion unit (GCU) are part of the commissioning process, this equipment is currently not used to reduce the venting of natural gas during gas trials.

The GTT green gas trial solution, which would reduce CH₄ emissions by almost 100 per cent, involves carrying out simultaneous operations, whereby one tank is gassing up while the adjacent tank is cooling down, thus enabling BOG vapour to be recycled instead of vented. Bringing the commissioning of the LDC and GCU equipment into the BOG recycling process; the use of nitrogen inert gas; and the strategic placing of three extra valves on the gas main, on Tank Nos 1, 2 and 3, completes the picture.

The new approach, stated David Colson, will reduce natural gas emissions during the gas trial to between 0 and 10 tonnes, all occurring during the gassing up of the tanks. In addition, the revised procedures would enable 250 m³ less LNG to be loaded for the gas trial and the presence of the extra valves would ensure that the period required for the trial would be virtually unaltered from the present practice.

Meet colleagues in person at the 65th Panel

With the expectation that COVID restrictions worldwide will continue to ease in the months ahead, the Society plans to hold its next Panel Meeting, the 65th in the series, excluding the two virtual events, as a face-to-face congregation of members in Athens on 30-31 March 2022. The 65th Panel has been delayed for two years running as a result of the global pandemic and the Society's members are looking forward to the Athens gathering with eager anticipation as it represents the first opportunity in three years for them to meet socially with a wide range of their colleagues and discuss topics of common concern.

The air of celebration that is set to permeate through the Athens meeting will be reflected in the ambitious conference agenda that is being developed for the two-day event. The wide range of technological advances and extensions to the gas supply chain currently taking place in the industry, not to mention the prospects for new liquefied gas cargoes and the growing environmental pressures to improve fuel efficiency and reduce atmospheric emissions, mean that SIGTTO's work programme has never been greater. There will be a lot to talk about in Athens!

Maran Gas will kindly host the 65th Panel Meeting as well as the 84th session of SIGTTO's General Purposes Committee (GPC 84) which will be held the day before, on 29 March.

Workload reflects pace of change in gas shipping

Traditionally, this column is an annual update on the work and long-term goals of SIGTTO's General Purposes Committee (GPC), complete with personal views, by the Committee's chair. GPC is currently between chairs, Mark Hodgson of Shell having stepped down earlier this year after a long tenure in the role and a new chair yet to be appointed. As a result this present article is based on an overview of GPC's current workload presented by Rob Farmer, SIGTTO's Principal Technical Adviser, at the Society's Autumn Virtual Panel Meeting on 5 October 2021. The usual personal Viewpoint article will be resumed next year, to be compiled by the newly appointed GPC chair.

Rob Farmer opened his presentation by highlighting how, although the overall number remains relatively static, the GPC membership is continually being refreshed with new faces, as the tenures of older members expire. The Committee currently has 34 members, 53

per cent of which have joined since the 80th GPC meeting was held in autumn 2019.

In spite of the switch to virtual meetings for GPC and its numerous working groups over the past 18 months, the Committee's workload has never been greater. Technological advances, growing pressure for enhanced environmental protection measures for ships and the need to continuously update SIGTTO's large portfolio of publications are driving the agenda.

The summary chart of GPC working groups and projects presented by Rob showed 15 initiatives, all of which will result in new or revised sets of industry best practice guidelines.

The 83rd meeting of the General Purposes Committee (GPC 83) was held on 7 October, two days after the Virtual Panel. Amongst other decisions taken at this gathering was an agreement to proceed with the revision of three other SIGTTO publications, i.e. *Liquefied Gas Fire Hazard Management* (2004), *Application of Amendments to Gas Carrier Codes Concerning Type C*

Loading Limits (1997) and *A Justification into the Use of Insulation Flanges (and Electrically Discontinuous Hoses) at the Ship/Shore and Ship/Ship Interface* (2014).

As the *Liquefied Gas Fire Hazard Management* document addresses issues that are covered in three other publications, it is proposed to review them as well with the aim of consolidation where appropriate. The additional three publications to be reviewed are *Guide to Contingency Planning for Marine Terminals Handling Liquefied Gases in Bulk* (2001), *Support Craft at Liquefied Gas Facilities: Principles of Emergency Response and Protection – Offshore* (2016) and *Support Craft at Liquefied Gas Facilities: Principles of Emergency Response and Protection – Onshore* (2015).

Also at GPC 83 the working groups on Gas Carrier CO₂ Emissions and LNGC Fugitive Methane Emissions submitted their respective concept draft documents for consideration. Both groups aim to have their final draft documents completed and ready for approval at GPC 84 in March 2022.

NEW PUBLICATIONS

ESD Systems



At the 77th meeting of SIGTTO's General Purposes Committee (GPC 77) in spring 2018 the Committee agreed to form a working group to revise *ESD Arrangements and Linked Ship/*

Shore Systems for Liquefied Gas Carriers (2009) to include advances in safety philosophy, technological improvements and lessons learnt from incidents.

Chaired by Ajay Edakkara of Shell, the working group consisted of ship and terminal operators and equipment manufacturers. The finished publication, with an updated title of *ESD Systems*, was approved by the Society's Board in May 2021 and is now available to download from the SIGTTO website.

This publication provides useful guidance for organisations involved in the design, integration and use of emergency shutdown (ESD) systems and related safety systems on gas carriers and terminals. It first explains the key philosophies that guide the design of safety systems, with reference to the requirements of *The International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk* (IGC Code) and the relevant standards

of the International Electrotechnical Commission (IEC) and International Organization for Standardization (ISO).

The publication then provides recommendations for ESD and related safety systems, including overflow control, ship/shore link and emergency release systems. Guidance for testing these systems is provided and the bowtie risk evaluation method is used to help explain the IGC Code requirements.

In addition to discussing the requirements of the IGC Code, this document recommends additional measures for linked ESD systems for LPG. An overview of the types of ship/shore link systems that are typically used in the industry is provided in the annexes, including guidance for cyber security issues associated with linked ESD systems.

Recommendations for Cargo Control Room HMI



Approved by the Board in May 2021 and now available to download from the SIGTTO website, *Recommendations for Cargo Control Room HMI* is the third and final publication prepared by the

Cargo Control Room (CCR) Ergonomics Working Group. Chaired by Ray Gillett

of GTT Training, this working group was established by the SIGTTO's Human Element Committee (HEC) in 2017. The first output was *Recommendations for Management of Cargo Alarm Systems*, published in 2019, followed by *Recommendations for Designing Cargo Control Rooms*, published in 2020.

Building on the previous two publications in the series, *Recommendations for Cargo Control Room HMI* recommends a human-machine interface (HMI) design process that is centred around the needs of the operator, allowing effective monitoring and control of the system. It is recommended that shipowners work with system designers, classification societies and shipyards to create an HMI that clearly presents the appropriate information and control functions.

The guidance in this document is based on established standards, such as *ISO 11064 – Ergonomic design of control centres*, which covers the principles and processes to follow when designing the HMI of a control station.

Specific guidance and examples are provided to explain the HMI design process, including examples of key questions to consider when specifying the requirements of the HMI. An example of a task-based display for a loading operation is provided to show how user feedback is used to improve the presentation of information to the operator.

NEW MEMBERS

The FSRU LNG Croatia has been in service at Krk Island in Croatia since the beginning of 2021



Eight join membership

Eight companies have joined the Society's membership since the Spring 2021 edition of *SIGTTO News* was published. The new members and their dates of joining the Society are shown below. The SIGTTO membership now stands at 139 Full Members, 49 Associate Members and 29 Non-contributory Members.

Wiscon Offshore & Marine (Hong Kong) Ltd	1 Mar 2021
Latsco LNG Marine Management Inc	1 May 2021
LNG Hrvatska	1 May 2021
V.Ships	1 Aug 2021
Hong Kong LNG Terminal Ltd	1 Oct 2021
Hongkong Salvage & Towage	1 Oct 2021
SAAM SA	1 Oct 2021
Byzantine Maritime Gas Pte Ltd	1 Nov 2021

Shipyards are traditionally outside the scope of SIGTTO membership. However, **Wiscon Offshore & Marine (Hong Kong) Ltd** has purchased an existing 1990s-built, spherical tank LNG carrier (LNGC) which it is converting for subsequent operation as a floating storage and regasification unit (FSRU), thus fulfilling the Society's membership criteria. To constitute a key

component of China's first floating LNG-to-power project, the FSRU will take delivery of cargoes from visiting LNGCs, regasify them and pump the natural gas to a nearby 240 MW combined cycle power barge for electricity generation.

Although Latsco Marine Management Inc is already a SIGTTO member through its participation in the management of the Monaco-headquartered group's LPG carriers, a separate membership was sought for its new participation in the LNG sector. **Latsco LNG Marine Management Inc** will be responsible for the group's first two LNGCs, the 173,400 m³ sisters *Hellas Diana* and *Hellas Athina*, recently delivered from the Hyundai Samho Heavy Industries yard in Korea.

LNG Hrvatska, or LNG Croatia in English, has recently put Croatia's first LNG import terminal into service. Commissioning work on the facility, which makes use of the 2005-built, 140,000 m³ LNGC *Golar Viking* converted into the FSRU *LNG Croatia* stationed at Krk island on the country's Adriatic coast, began in late 2020 and the terminal commenced commercial operations on 1 January 2021. *LNG Croatia* has the capacity to regasify 1.9 million tonnes per annum (mta) of LNG. Hrvatska Elektroprivreda (HEP), the state-owned gas and electricity utility, holds an 85 per cent interest in LNG Croatia, while the remaining 15 per cent is held by Croatia's gas transmission system operator Plinacro.

One of the world's leading ship management groups, **V.Ships**, has renewed its commitment to the LNG sector, rejoining SIGTTO after letting its membership lapse in 2019. A new LNG management team has been appointed and the company aims to build on its involvement in the crew and ship management of not only LNGCs but also LNG-fuelled vessels. Back in 2006 the V.Ships syllabus was the first of the LNGC crew competency training courses recommended by SIGTTO to gain approval.

Hong Kong LNG Terminal Ltd has joined SIGTTO as an Associate Member and is developing Hong Kong's first LNG reception facility. The terminal will make use of Mitsui OSK Line's 2017-built, 263,000 m³ FSRU *Challenger*, one of the largest FSRUs yet constructed, to import up to 4 mta of LNG. Hong Kong LNG Terminal shareholders are CLP Power, Hong Kong Electric and Castle Peak Power (Capco), the latter partially-owned by CLP. The terminal is expected to commence operations in 2022, at which point Hong Kong LNG Terminal Ltd will move to full SIGTTO membership.

Part of the CK Hutchison Group, **Hongkong Salvage & Towage** is poised to supply the support vessel services for the new Hong Kong LNG Terminal project described above and has joined SIGTTO as an Associate Member. The company's tugs will not only escort LNG delivery carriers through port approaches to and from the terminal's moored FSRU but also carry out berthing and emergency response duties at the FSRU jetty. The offshore jetty is being constructed near the Soko Islands in the southern reaches of the Hong Kong Special Administrative Region (HKSAR).

SAAM is a Chile-based tug and towage company that operates a fleet of 170 tugs throughout South and Central America, Mexico and Canada. The fleet includes vessels that provide escort/berthing/emergency response services at six gas terminals, the latest of these projects being the Energia del Pacifico (EDP) FSRU-based LNG receiving facility at Acajutla in El Salvador. SAAM is providing two new tugs, each with a bollard pull of 80 tonnes, for the 2 mta EDP terminal which is expected to commence commercial operations before the end of 2021.

Joining as a Full Member of the Society, Singapore-based **Byzantine Maritime Gas** owns five mid-size, fully refrigerated LPG carriers and has two further such vessels under construction. Byzantine's gas carrier fleet is managed by sister company Western Shipping, also of Singapore.

MEMBER PROFILE

Naftomar – key link in the door-to-door LPG supply chain

Naftomar has come a long way since the company was established as a petroleum product trader in Beirut in 1972, specialising in the Eastern Mediterranean market. The potential in the region's gas sector soon became apparent and the company concluded its first LPG purchase, transport and sale transaction in 1976 when a chartering and ship management office was opened in Piraeus, Greece. Later, a representative office was established in Paris under the name Chemigaz to consolidate links with the oil majors, LPG brokers, buyers and sellers and thus develop wider market opportunities.

As the company's involvement in LPG trading grew, and to ease its reliance on the then patchy vessel charter market, Naftomar bought its first LPG carrier, - the 4,000 m³ fully pressurised *Gaz Unity* - in 1977. The purchase signalled the start of a full commitment to LPG carrier ownership and operation over the years, to complement and reinforce the company's trading activities. The wide-ranging service offering is reflected in the company's full name - Naftomar Shipping & Trading Co Ltd.

A landmark in Naftomar's growing involvement with LPG was the purchase of a 40,000-tonne cargo onboard the 75,000 m³ very large gas carrier (VLGC) *Northern Eagle* in 1980. Stationed in the Mediterranean, *Northern Eagle* transhipped its cargo to smaller LPG carriers, for onward delivery to the final customer, in a series of ship-to-ship (STS) transfer operations.

The *Northern Eagle* initiative was amongst the LPG shipping industry's first involvements with floating storage/STS transfer arrangements and was to presage a growing commitment by Naftomar to this increasingly important type of LPG distribution operation. The company was the first to make use of floating LPG storage to help China meet its growing LPG import requirements in the 1990s and since that time has engaged in more than 4,000 STS operations worldwide, involving over 10 million tonnes of LPG.

Onward distribution options with floating LPG storage are not limited to STS transfers. It is also possible to offload direct from a pressurised gas carrier over the jetty to LPG road tankers and rail tank cars. Naftomar has made use of all these options to help develop new markets where there is latent LPG demand, irrespective of the customer's volume requirement.

At the same time that it was building its presence in LPG shipping Naftomar



The 84,000 m³ *Gaz Imperial* - the largest ship in Naftomar's current gas carrier fleet

was extending its field of liquefied gas expertise and its customer base to encompass petrochemical gases such as ethylene, propylene and crude C4 olefin fractions. Participation in this sector was facilitated by, initially, the chartering of flexible semi-pressurised/fully refrigerated (semi-ref) vessels and, later, the placing of newbuilding contracts for such ships.

Naftomar placed its first LPGC newbuilding order at Hyundai Heavy Industries in 2000. This was the 22,662 m³ *Gaz Millennium*, a vessel which was constructed for a specific trade and which is still active in the company's fleet. Since then the company has contracted many LPGC newbuildings at yards in China and Korea. Naftomar's current fleet numbers 19 LPGCs and incorporates a full range of vessel types, from fully pressurised ships through to semi-ref vessels and VLGCs. Ships in the fleet range in size from 7,200 to 84,000 m³.

Naftomar has now been operating LPG ships for 44 years and safety has remained the key focus for the company throughout. "Experience has shown that the best way to achieve our goals is by investing in human resources for our shipping operations," states George-Paul Perantzakis, Naftomar's fleet director.

"For this reason we have established a comprehensive cadetship programme that helps us select and recruit individuals of proven quality. We then put these recruits through our in-house training courses that cover our particular quality standards and the details of our LPG shipping operations. This strategy enables us to establish a suitably educated and skilled workforce, with the accompanying mindset we require, that can be incorporated into our company structure from the very beginning of their career."

Naftomar has enjoyed and benefitted from a close relationship with SIGTTO over many years. The company has been a

member of the Society's General Purposes Committee (GPC) since 2005 and has been present on SIGTTO's Board of Directors since 2019. In addition to being a member of the Board, George-Paul Perantzakis has chaired the Society's working groups dealing with the LPG STS transfer guide and the LPG crew competence guidelines.

"SIGTTO represents a solid foundation for the gas shipping and terminal industry by ensuring that all parties involved speak the same language, use the same standards and work to the same high level of safety," points out George-Paul Perantzakis. "The Society embodies our common and ongoing efforts for improvement and provides us with targeted and critical guidance both onboard and ashore."

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