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SIGTTO NEWS

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MESSAGE FROM GENERAL MANAGER



COVID-19 Edition!

SIGTTO General Manager Andrew Clifton

describes how SIGTTO and the LNG and LPG industry have embraced remote technologies and practices to combat the pandemic

The Covid-19 pandemic has affected everyone and every organisation worldwide in an unprecedented manner. All businesses have been impacted to some extent and SIGTTO is certainly no exception.

Much like members of other maritime non-government organisations (NGOs) based in London, the SIGTTO Secretariat has been working remotely since mid-March. The technical work is continuing through virtual working group meetings. This is something we have never had to do before and there have been some necessary adjustments to our internal processes, requiring more pre-work and preparation from the technical staff. Virtual meetings cannot be as long as face-to-face meetings, without losing the audience's attention and reducing their value.

SIGTTO remains fully open for business and accessible through our normal phone lines and emails for any technical, membership or other enquiries. Although the Society has not been impacted as much as other organisations, the lack of face-to-face meetings, both for our technical working groups and for the members themselves, has been the major issue for us. For example, on an annual basis, we would normally hold 11 or 12 Regional Forums worldwide as well as other gatherings of our members such as Panel Meetings.



Business as usual at sea - although the rate of growth in the worldwide movement of LNG has slowed in 2020, there has been no decrease in the volume carried by sea as a result of the Covid pandemic

"SIGTTO remains fully open for business and accessible through our normal phone lines and emails for any technical, membership or other enquiries."

To mitigate the lack of face-to-face meetings for membership engagement, the Society is using webinars to engage with its members during the Covid-19 period. These are extremely popular and the technology allows members to join and interact from their own offices and homes. To address the issue of working across multiple time zones and accommodate our international membership, SIGTTO held its 23 July kick-off webinar twice, both early in the morning UK time and then again late in the afternoon, with the same content for both (see the accompanying panel article

for more details about SIGTTO webinars).

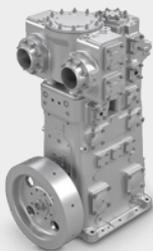
To its great credit the LNG and LPG shipping industry has maintained continuity of operations throughout the course >

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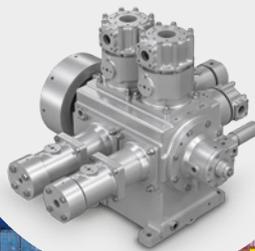
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MESSAGE FROM GENERAL MANAGER

> of 2020 and SIGTTO is not aware of a single vessel or terminal which has ceased operations due to Covid-19.

For me seafarers have been the unsung heroes, keeping the supermarket shelves stocked and the lights burning. However, because Covid-19 containment measures have restricted travel and crew changes, most seafarers have been kept onboard well past their scheduled end of contract date. At the time of writing carrying out crew changes are still procedures which present difficulties in many parts of the world. Another challenge for operators is the inability to arrange for service engineers to travel to ships and terminals.

Depressed oil and gas prices, falling energy demand, storage tanks nearing capacity and question marks over future investments in the current economic climate are all concerns for the gas shipping and terminal industry. However, LNG and LPG have continued to be traded throughout the Covid-19 period in volumes not markedly dissimilar to those that pertained in 2019.

Our industry has also adopted new ways of doing business as a means of coping with the restrictions imposed to control the spread of Covid-19. It has embraced remote ship vetting and inspections; secured extensions to certificate and survey dates from class societies and flag administrations; and carried out drydockings remotely, without anyone from the operator's head office necessarily being present.

SIGTTO has traditionally been the provider of best practice guidance and recommendations to the gas shipping and terminal industry since its inception over four decades ago. Despite the pandemic the Society has continued to provide such guidance and has remained open for business throughout. The articles in this issue of *SIGTTO News* provide more detail on how the Society has been functioning during 2020.

I am very pleased to welcome Alex Hammond to the Secretariat. Alex joined SIGTTO in March 2020 as Technical Adviser on a three-year secondment from Shell. Alex brings with him to his new post a wealth of experience on marine operations, LNG operations, ship management, piloting and terminal operations. Most recently, Alex has worked for Shell in Brunei and will be well known to several of our members. We wish to thank Shell for their support. Alex replaces Uluc Kaypak who recently left SIGTTO.

We hope that our regular Regional Forums and face-to-face meetings can resume in the near future. At present we are not scheduling any such meetings, apart from those listed in the Upcoming Meetings table on page 13, until the situation becomes clearer. The April 2020 Panel,



Drydockings have been taking place under remote direction from head office

Meeting, which had been due to be held in Athens, has been postponed until April 2021, and is also set for the Greek capital.

The 82nd meeting of SIGTTO's General Purposes Committee (GPC 82) had originally been due to be held in Singapore in September 2020 in conjunction with Gastech 2020. The Society's Singapore GPC session has now also been postponed for

12 months and will be staged as the 83rd GPC meeting. GPC 83 and Gastech 2021 will both take place in Singapore during the same week in September 2021.

My final thoughts are with those who have lost their lives due to Covid-19 and their families and friends. We hope that we can all draw a line under this issue very soon and that life returns to normal.

WEBINAR

New mode of member outreach

As mentioned in the General Manager's Message beginning on page 1 of this newsletter, SIGTTO has been unable to hold its usual wide range of face-to-face meetings amongst its membership due to the Covid-19 virus. Webinars have been introduced as one way of tackling the problem; they enable the Society's members to not only keep up to date with progress being made by the organisation but also interact with the Secretariat and introduce their own input as they see fit.

SIGTTO held its first webinar this past 23 July, with the two-hour morning session being staged again in the afternoon to accommodate members in different time zones. Attendee feedback signaled a high level of satisfaction with this means of communication and the second and third webinars will be held on 20 October and sometime in November or December at a date still to be determined.

Four presenters contributed to the two 23 July sessions. SIGTTO General Manager Andrew Clifton opened proceedings with some general

background information on how the Society has been coping since the outbreak of the pandemic and the good progress that is being made despite the current circumstances. He was followed by the Secretariat's Marketing Executive Bella Mao who described SIGTTO's ambitious new marketing initiative. Mark Hodgson and Steve Allibone, respective chairs of the Society's General Purposes and Human Element Committees, rounded out the webinar with overviews of the current work programmes and accomplishments of the two bodies. A full report on Bella's marketing campaign is given on page 11 while Mark Hodgson's annual GPC update can be found on page 7.

There were 116 attendees of the morning session of the 23 July seminar while 41 people participated in the afternoon session. There was a strong level of feedback to the post-session questionnaires on what participants thought of the content, quality and length of the webinar and SIGTTO's initiative in reaching out to the membership in this way won high levels of praise on all points. The full webinar can be accessed on the Society's website: www.sigtto.org.



The revision of SIGTTO's LPG crew competency standards now getting underway will cover ethane carriers for the first time

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).

Floating LNG installations

The final draft of this document has been submitted to the 81st GPC meeting (GPC 81) for approval. This project was the outcome of a GPC member survey and the creation of the Floating Systems Sub-committee. The document provides guidance for the safe technical assessment and operations of floating storage and regasification units (FSRUs), floating storage units (FSUs) and LNG floating production storage and offloading (LNG FPSO) units. This includes site assessment and design considerations and operational best practices.

There has been excellent engagement and support provided by industry operators of FSRUs and LNG FPSOs. Working group members and information gathered in this project have helped to contribute to an HEC working group's development of FSRU suggested competency standards. This has been included as an additional annex in the third edition of *LNG Shipping Suggested Competency Standards*, which is due to be published in the next few months.

Gangways

Chaired by Rick Boudiette of Chevron Shipping, SIGTTO's Gangways Working Group has completed its *Guidance on Gas Carrier and Terminal Gangway Interface* publication, which has been submitted to GPC 81 for approval. The document provides ship and terminal designers and operators with recommendations on gangway design, operations and compatibility determination. The guidance covers different gangway types and configurations and provides

recommendations designed to maximise safe access to the ship via the gangway. The guidance encourages a structured approach to hazard management by the use of risk assessments.

Emergency shutdown (ESD) systems

The ESD working group is revising *ESD Arrangements and Linked Ship/Shore Systems for Liquefied Gas Carriers*, a SIGTTO publication produced in 2009. The group, which is chaired by Ajay Edakkara of Shell, held its last face-to-face meeting in SIGTTO's London office in January 2020. It has successfully continued its work through virtual meetings, most recently in September. The working group has a mature draft document that it will finalise this year and submit to GPC 82 in spring 2021 for approval.

Gas carrier propulsion systems

This working group is chaired by Kenny English of BP and is the outcome of a GPC member survey. The working group continues to gather and refine information on safety, environmental and operational issues associated with gas carrier propulsion systems. An initial draft document is now being generated.

Gas carrier reliquefaction systems

The Reliquefaction System Working Group, which is also chaired by Kenny English, continues to prepare guidance on reliquefaction systems utilised onboard modern gas carriers. The group is writing a new publication containing operational best practice guidance for the safe and efficient use of these systems and is refining information on safety, environmental and operational issues.

Gas carrier salvage

This project was initiated by GPC

members and the terms of reference for this new working group were approved by GPC 80 in autumn 2019. Chaired by Ian Wolforth of Chevron, the working group continues to gather information related to potential salvage situations on gas carriers, with their primary focus on prevention and preparedness.

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)*, into a single revised publication. They will use a risk-based approach, considering technical improvements that have been made and lessons learnt from incidents since the original documents were published. The working group has met twice since it was formed in June 2020 and is currently compiling an initial draft document.

Selection and testing of valves for LNG/LPG applications

Chaired by John Taylor of Shell, this working group is combining and revising 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 publication. They will use a risk-based approach, considering technical improvements that have been made and lessons learnt from incidents since the original documents were published. The working group has met twice since it was formed in June 2020 and is working on compiling an initial draft document.

Environmental Sub-committee

Following the approval of its terms of reference in autumn 2019, this new Sub-committee has been established as the leading SIGTTO group for gas shipping and terminal environmental issues management. Its principal focus is on environmental issues that are specific to gas shipping, floating gas terminals and shore terminal interfaces. The GPC Constitution is now being revised to incorporate the Environmental Sub-committee's remit.

Chaired by Rahul Kulkarni of BP, it is comprised of GPC members representing BP, Cheniere, Chevron, Enagas, ExxonMobil, Maran Gas, Shell and Total. The Sub-committee has held two meetings so far, at which it identified potential focus areas. It has now proposed to GPC 81 the creation of four new working groups, primarily dealing with gas carrier CO₂ and methane emissions.

HUMAN ELEMENT COMMITTEE WORKING GROUPS

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

Cargo control room (CCR) ergonomics

Chaired by Ray Gillet of GTT Training, the Cargo Control Room (CCR) Ergonomics Working Group is finalising its third and final document, *Recommendations for Cargo Control Room Human Machine Interface*. This builds on the work of the group's second document *Recommendations for Designing Cargo Control Rooms*, which was approved by the SIGTTO Board in September 2020.

This third document recommends adopting established human factors principles and processes when designing the human-system interface of a CCR. It aims to maximise the safe, reliable, efficient, and comfortable use of displays and controls in the CCR. The last meeting was held in September 2020 when a mature draft was further considered with a view to submit this to HEC for approval in the new year.

Shore staff competencies

Chaired by Jo McDade of Chevron, the shore staff competency management system project was initiated by SIGTTO members and the revised terms of reference were approved by the HEC in July 2018. The working group continues to gather and refine information associated with suggested best practices. They aim to identify and develop a competence management system for shore staff that adds to a company's human factor toolkit. The working group is now working with an initial draft master document.

LPG shipping suggested competency standards

Following the completion of the third edition of *LNG Shipping Suggested Competency Standards*, which was approved by the Board in September 2020, this working group has started work to revise *LPG Shipping Suggested Competency Standards (2008)*. The terms of reference for this working group were approved at the 9th meeting of HEC (HEC 09) in July 2020 and by the SIGTTO Board in September 2020.

Chaired by Steve Allibone of MOL, the working group is using a similar methodology to that employed in the *LNG Shipping Suggested Competency Standards* revision. It will focus on how working practices and competencies have been affected by changes in the industry and new technologies and improvements in safety, as well as lessons learnt from past incidents. Specifically new to this version is the carriage of ethane as well as the use of LPG cargo as a propulsion fuel. The working group has met frequently over the past few months and is making good progress with the revision.

Cargo resource management

This new working group had its terms of reference approved at HEC 09 in July 2020 and by the Board in September 2020. Chaired by Steve Allibone of MOL, this working group will develop a document on a model gas cargo resource management training course. They will consider the behaviours required to achieve an effective cargo team and a safe team culture, identify critical operations and identify lessons learnt from past incidents.

NEW PUBLICATIONS

LNG Shipping Suggested Competency Standards

Approved by the SIGTTO Board in September 2020, with plans to publish later this year, this publication is the first output of the Human Element Committee's (HEC's) review of its four competency related publications. It updates and replaces the previous edition, *LNG Shipping Suggested Competency Standards (2008)*.

The new edition provides additional clarification and updates to existing topics and incorporates advances in technologies currently being used in the LNG industry. Specifically new to this version is the development of suggested competencies for floating storage and regasification unit (FSRU) cargo operations as a standalone annex for FSRU personnel.

Standards to ensure consistent levels of competence can help to improve safety on an industry-wide basis. The revised *LNG Shipping Suggested Competency Standards* document benefits from the experience and knowledge of SIGTTO members in the fields of training and LNG cargo operations. The update, which is expected to add value to a company's competence management system, reflects technological advances and lessons learnt from incidents since the previous edition was published.

SIGTTO's new guidance on gas carrier cargo control room design cross-references an important set of ISO standards



Steve Allibone of MOL, the HEC chair, also chaired the working group responsible for preparing the new edition of the *LNG Shipping Suggested Competency Standards*. The group is now focusing on a revision of the next document in this series, i.e. the *LPG Shipping Suggested Competency Standards*.

Recommendations for Designing Cargo Control Rooms

Approved by the SIGTTO Board in September 2020, with plans to publish later this year, *Recommendations for Designing Cargo Control Rooms* is the second publication prepared by the HEC's

Cargo Control Room (CCR) Ergonomics Working Group. The first document was *Recommendations for Management of Cargo Alarm Systems*, published in 2019. The working group, which is chaired by Ray Gillett of GTT Training, is currently developing its third and final publication, *Recommendations for Cargo Control Room Human Machine Interface*, dealing with the user-friendly design of the CCR interface between operators and systems.

The Recommendations for Designing Cargo Control Rooms document recommends the application of ergonomic design principles to gas carrier CCRs, more specifically that shipowners work with system designers, class societies and shipyards to create an operational philosophy to guide the implementation of these design principles in the development of CCRs.

The document also recommends that the guidance given in *ISO 11064-Ergonomic design of control centres*, an established set of ISO standards, be adopted as they could help in improving the design of cargo control rooms on new gas carriers. The new SIGTTO CCR design recommendations cover aspects such as control station layout, physical environment, operator interface, controls and displays.

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Insights from the GPC chair Mark Hodgson



It is a year on from my first *SIGTTO News* Insights article as chair of the SIGTTO General Purposes Committee (GPC) and much

has happened in the interim that has impacted the work of the Committee and its Working Groups. Despite the constraints of recent months and to the great credit of all active Committee and WG members, momentum has been maintained in the pursuit of the GPC work programme.

My last article introduced the GPC priorities from our 2017 survey that set the direction in support of the wider SIGTTO strategy. Since then GPC has taken further guidance from the SIGTTO Strategic Plan 2019 and distilled this into six specific themes or imperatives, as shown in Table 1, that will steer our upcoming deliberations and work programme.

The identification of these imperatives and our prioritisation discussions have enabled us over recent GPC sessions to become more aligned and focused. More specifically, we have taken the following steps:

1. Established the first SIGTTO GPC sub-committee, i.e. the Sub-committee for Floating Gas Terminals, which required us to amend the GPC Constitution, with SIGTTO Board approval, to allow this. The new body will soon deliver valuable and important guidance based on industry experience and

Table 1 Key GPC strategic and leadership imperatives

	WHAT	HOW
1	Deliver and perform	Guidance document development in accordance with resource priorities
2	Focus Process Safety	Learning from Incidents, gaps and improvement Identification – new project proposals
3	Support membership engagement	Newsletter, RF, webinar and panel attendance. Maintain GPC balance of representation
4	Visibly support Environmental agenda	Environmental Subcommittee, efficiency, methane emissions, decarbonising gases (LH2, CO2)
5	Reduction of industry risk	Collaboration/Influence with IMO, ISO, NGOs, HEC
6	Stay current	Capture new business sectors and technologies (Floating gas terminals, Propulsion, hydrogen)

best practice in this emerging sector of our industry that has not been explored before.

2. Established a second sub-committee, i.e. the Environmental Sub-committee (ESC), specifically to examine, assess and guide environmental impacts and improvements within our business. ESC’s work starts in earnest very soon, focused initially on carbon dioxide (CO₂) and methane emissions.

3. Created a list of 12 Key Performance Indicators (KPIs), demonstrating our focus and achievements in such areas as:

- a. work efficiency and delivery, including continued balance of representation, new guidance and updating existing documents with suitable SIGTTO Human Element Committee (HEC) engagement incorporating lessons learned and Board approval;
- b. collaboration with other non-governmental organisations (NGOs);
- c. supporting regulatory development (IMO and ISO);
- d. supporting membership engagement through SIGTTO Regional Forums,

Panel Meetings and Webinars; and e. identifying and tracking industry issues for decision-making in GPC as appropriate and with zero overdue items.

To date, all our KPIs are healthy and will be reviewed at each GPC for continuous improvement opportunities.

4. Addressed areas that, considering the rapid development and diversification of our industry, have yet to provide members with guidance and best practice on a prioritised basis. Such emerging areas include new ship propulsion systems and, going forward, the carriage of liquid hydrogen and liquid CO₂.

GPC continues to drive improvement in delivering guidance and best practice to SIGTTO members with a forward-looking agenda. The work programme is influenced by the strategic direction and feedback provided by wider SIGTTO and industry-collaborative activities. See page 4 for details of the latest progress being made by individual GPC sub-committees and working groups.

PEOPLE

Alex Hammond joins team as Technical Adviser



Alex Hammond has joined SIGTTO as a Technical Adviser on a three-year secondment from Shell.

Setting off on his career path, Alex chose a life at sea and his first brush with gas carriers came early. He was taken on by Shell as a deck cadet in 1980 and gained his master’s certificate in 1992 after service on a wide range of Shell’s deepsea tonnage, from his second seagoing voyage on an LNG carrier and subsequently in all ranks up to chief officer on the Brunei and Malaysia to Japan LNG trades.

In 1995 Alex was seconded to Brunei

Shell Petroleum where he spent four years as an offshore operations supervisor with duties that included the role of pilot and loading master for the Brunei LNG ships.

In 2001 Alex joined Shell International Trading and Shipping Company (STASCO) in London as a marine technical adviser. In that role he was assigned a number of projects relating to new LNG export and import terminal studies, including early work on floating LNG production, and LNG carrier fleet expansion and newbuild schemes. The latter involved significant ship/shore interface and compatibility assessments.

There followed a tenure in business management and from there Alex moved to the maritime assurance of Shell’s marine business operations globally. The new role involved visiting and auditing operational sites, including LNG ship and terminal assets, against Shell and industry standards.

Roles in offshore vessel and drilling

assurance followed. He then returned to Brunei in 2016 for a further four years as deputy fleet manager for the Brunei Gas Carriers fleet of LNG vessels, managing some of the ships he once sailed on, prior to commencing his secondment to SIGTTO.

“In my past roles I have relied on industry guidance and standards such as those produced by SIGTTO to safely perform operations and assist in making the right decisions while carrying out my business assurance and support work,” states Alex Hammond.

“I am pleased to be able to continue Shell’s tradition of supporting SIGTTO with this assignment as a Technical Adviser for the Society. In this new role I am looking forward to giving something back, utilising my experience in the development of new and revised publications, to support the ongoing drive to help our industry maintain its excellent safety and operational record”.

Australia's largest industrial project involved the construction of a major LNG export terminal on a very remote stretch of coast



North West Shelf puts Australia in LNG big league

When Woodside Petroleum was awarded the rights to drill for oil and gas off the coast of Western Australia in 1963, little did this very small independent Australian exploration company realise that within 26 years its new venture would give rise to what would be the country's largest ever industrial project.

The process of realising the huge North West Shelf (NWS) LNG export project, which culminated with the departure of the 125,000 m³ *Northwest Sanderling* from the new terminal on Withnell Bay near Dampier with an inaugural cargo on 28 July 1989, required Woodside to make two transitions. First, it stepped up from being a simple exploration company to become an exploration and development enterprise. Shortly thereafter it was called upon to broaden its scope yet again and add the discipline of production to those of exploration and development.

The Woodside offshore permit area was huge and the water depths great,

with over 500 metres of water in at least one-third of the permit zone. The company knew from the start that it would require assistance and, after a worldwide search for partners, a joint venture was set up in tandem with Shell, BP, Chevron and Burmah Oil. The latter was later replaced by BHP.

Following the start of exploratory drilling in 1967, major gas/condensate deposits were discovered in the North Rankin, Goodwyn and Angel fields, some 130 km offshore from Dampier, in 1971-72. Early efforts to develop these resources were delayed by government policy but by 1979 a viable project had been defined. There was enough gas to not only supply the Western Australia domestic market but also support LNG exports to Japan.

The Iranian revolution and the second oil crisis that occurred that year boosted the price of oil and meant that it was a good time to launch a major energy project. The two oil crises of the 1970s had also intensified Japan's interest in LNG imports as part of a drive to diversify its energy sources.

In August 1984 the 45,000-tonne North Rankin A offshore rig, which had the largest production capacity of any gas platform in the world, began piping gas ashore for the

domestic market; this was the Domgas phase of the project. At that point Woodside still controlled 50 per cent of the NWS scheme.

Meanwhile, in June 1981 the NWS partners signed memoranda of intent with eight Japanese utilities covering the supply of an aggregate 5.84 million tonnes per annum (mta) of LNG for 20 years from three liquefaction trains beginning in 1986. The eight members of the Japanese buyers consortium were Tokyo Electric Power Co (Tepco, which signed up for 1.18 mta), Chubu Electric Power Co (1.05 mta), Kansai Electric Power Co (1.13 mta), Chugoku Electric Power Co (1.11 mta), Kyushu Electric Power Co (1.05 mta), Tokyo Gas (0.79 mta), Osaka Gas (0.79 mta) and Toho Gas (0.23 mta).

The preliminary deals with the Japanese buyers coincided with a period of rising inflation, and hence construction costs, in Australia. This prompted a reassessment of the LNG phase of the project and it was subsequently agreed by all parties concerned to implement several changes to the original development plan. First it was agreed to push the start date of the LNG phase back to October 1989; to delay commissioning of the third liquefaction train by two years; to introduce new

liquefaction technology; and to amend the shareholdings in the NWS venture. Under the new ownership arrangement Woodside, Shell, BP, Chevron, BHP and a joint Japanese company comprising Mitsubishi and Mitsui would each control one-sixth of the shares in the NWS project.

These partners made the final investment decision to proceed with their LNG export scheme in July 1985 and it is the 35th anniversary of this milestone in Australian and LNG history that this article is celebrating.

When *Northwest Sanderling* departed the Withnell Bay terminal on a remote part of the Australian coast with that first cargo, the facility had two liquefaction trains of 2.5 mta capacity each, four 65,000 m³ storage tanks and a marine jetty. Significant reductions in LNG production costs were achieved through the world's first application at a liquefaction plant of a combination of air cooling and gas turbines. The technology replaced the more traditional water cooling and steam turbine approach to producing LNG.

The NWS project participants initially required seven 125,000 m³ LNGCs, i.e. *Northwest Sanderling* and six spherical tank sisterships, and North West Shelf Shipping Services Company (NWSSSC) was established to manage the fleet. All seven were built in Japan, with Mitsubishi Heavy Industries (MHI) being the lead yard and builder of three vessels, Mitsui Engineering & Shipbuilding (MES) contributing three and Kawasaki Heavy Industries (KHI) one. They were the first Moss spherical tank ships to be provided with only four cargo tanks, as opposed to the more usual five.

The third 2.5 mta train entered service in 1992 and the following year the NWS terminal, the world's tenth LNG baseload plant, reached peak deliveries to its Japanese customers, meeting 16 per cent of the country's natural gas needs. With each ship making 14 round trips annually, NWS was dispatching 100 cargoes to 10 different receiving terminals in Japan over the course of a year. By that point a decision had been taken to build an eighth ship for the project and that vessel was delivered by MHI in December 1994.

Today the Withnell Bay terminal has five trains and an aggregate LNG production capacity of 16.3 mta, entering its fourth decade of operations and one of the largest such facilities in the world. The story of the birth of the NWS project still inspires. At one stage early in its existence as an exploration company Woodside Petroleum had the equivalent of US\$150 in its bank account. Realisation of the first three-train phase of the NWS LNG endeavour would cost the project partners US\$9.4 billion.

NEW MEMBERS



EXMAR has extensive experience of LNG ship-to-ship cargo transfer operations

AEX joins membership

One company has joined the Society's membership since the Spring 2020 edition of *SIGTTO News* was published. The new member and its date of joining the Society are shown below. The SIGTTO membership now stands at 133 full members, 48 associate members and 29 non-contributory members.

AEX LNG Management Pte Ltd 1 Apr 2020

AEX LNG Management Pte Ltd, based in Singapore, is a joint venture between EXMAR Ship Management and Anglo-

Eastern Univan Group. The company is dedicated to LNG carrier newbuilding planning and supervision as well as technical vessel and crew management on behalf of third-party owners. The new company is able to bring to bear EXMAR's niche expertise in the LNG sector and Anglo-Eastern's systems, resources and global reach, including its network of strategically located maritime training centres and state-of-the-art simulators, for the growing LNG carrier market.

EXMAR's LNG shipping expertise encompasses not only LNG carriers but also floating storage and regasification units (FSRUs), ship-to-ship (STS) transfers and floating LNG production vessels.

BENEFITS OF SIGTTO MEMBERSHIP

SIGTTO members are actively encouraged to promote membership when dealing with any new players in the industry. Please direct them to our website and to the London Liaison Office for further details of how to join.

In addition to the credibility in the industry that membership brings, SIGTTO members benefit by:

- Access to information that is exclusive to members, such as casualty information and industry statistics
- Regular updates on matters affecting the industry such as legislation, either new or pending, technical or operational developments
- Access to the very comprehensive technical library maintained in the London Office
- Access to the Technical Advisers in the London Liaison Office who can give advice and obtain advice, on behalf of a member, from within the Society
- Submitting proposals for projects and studies to the General Purposes and Human Element Committees
- Participating in discussion forums with other members each year on topics of particular and mutual interest
- New members receive a copy of all publications, free of charge, produced by SIGTTO
- Free access to the LNG Web Info portal for updated LNG information as required to conduct compatibility studies. This information is restricted to members of SIGTTO and GIIGNL only
- Regular updates on matters affecting the industry such as legislation, IMO, technical or operational developments



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IN A CHANGING WORLD**

Enhanced engagement to boost membership

SIGTTO has a strong and loyal membership which has grown over the years in tandem with the expansion of the gas shipping and terminal industry. Approximately 90 per cent of companies active in LNG ship and terminal operations are members while for the LPG sector the figure is 50 per cent. Over 25 per cent of the membership have been members of the Society for more than 20 years.

As of July 2020 the Society had 133 full members, 48 associate members and 29 non-contributory members as well as a membership presence in 50 countries around the world. Prior to the outbreak of the Covid-19 pandemic LNG and LPG carriers constituted the fastest growing sectors of the world merchant fleet, and there is great potential for a resumption of strong growth in gas ship activities once the worst effects of the virus are over. A number of major gas export projects are under construction worldwide and the inventory of terminals importing LNG, LPG and chemical gases continues to grow.

There is therefore good potential for SIGTTO to add to its membership tally in the years ahead. New members joining the Society are able to gain immediate

access to vast body of expertise established by the membership since SIGTTO was established in 1979.

Following a major revision and update to ensure that the Society meets the needs and expectations of its membership in the 21st century, SIGTTO's Strategic Plan 2019 was approved by its board of directors in November 2018. The document sets out a future vision, including relevant goals, up to 2025. One of the Plan's strategic objectives is to secure as SIGTTO members 100 per cent of those companies involved in the operation of gas carriers and terminals.

The effort to expand the membership involves not only the acquisition of new members but also a further increase in the level to which existing members are retained. SIGTTO launched a targeted marketing campaign early in 2020 in the drive to achieve this membership strategic goal. The initiative is being led by Bella Mao, a young Taiwanese national fluent in Mandarin, English and Japanese and with experience of international brand management and integrated marketing implementation.

"Bella has been appointed on a 12-month contract as Marketing Executive, a new role for SIGTTO," states Andrew Clifton, the Society's General Manager. "The primary function of the role is to increase the size of the membership in an



Bella Mao - Marketing Executive for SIGTTO

industry with an ever-increasing number of stakeholders. Secondary responsibilities include publication marketing and boosting the overall visibility of the Society both inside and outside the shipping industry. I'm pleased to say that Bella has taken on the challenge with gusto."

Bella Mao presented a detailed review of this marketing campaign and the progress being made in a wide-ranging webinar hosted by SIGTTO this past 23 July (all the webinar presentations are available on the SIGTTO website; see page 3 for more information about this and upcoming Society webinars). As mentioned, membership expansion and membership retention are the primary focal points of the marketing initiative.

The expansion of the Society's membership relies on targeted prospecting for eligible new members; attracting potential new members through efforts to enhance the visibility of SIGTTO, not least through its publications, social media and scheduled regional meetings; and through referrals from existing members. Enhanced efforts on all three fronts are underway and initial results are promising.

Asia continues to be the largest market for LNG, LPG and chemical gases and the continued strong demand for these products in the region means that it also holds the greatest potential for new members. China and Japan, the world's two largest markets for LNG and LPG, have been identified as the countries holding the best potential for new members but the fact that English is not the first language in the two nations poses challenges in optimising that potential.

SIGTTO is using the language skills of Bella Mao to reach out in ways not previously possible. For example, the SIGTTO website has been provided with >

Tactics for achieving SIGTTO membership expansion



- Situation analysis for attrition
- Reinforce current engagement
- Membership feedback system
- Outbound: Prospecting for eligible members
- Inbound: Visibility enhancement and publication promotion
- Referrals from members in the Society



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MARKETING

> a Mandarin section and some of the Society's resources, including a recent promotional film, are being translated into Mandarin. The initiative helped to double the number of Chinese visitors to the SIGTTO website during the first half of 2020.

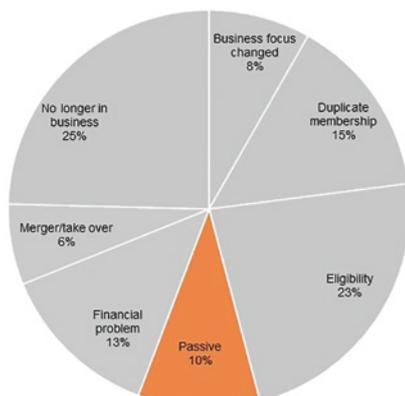
To understand the issue of membership retention Bella Mao analysed SIGTTO member renewals over the past two decades. It was found that approximately 90 per cent of the company resignations over the period have been for "unavoidable" causes, such as mergers/takeovers, financial problems, exiting the gas business, eligibility and duplicate membership, which in no way reflect negatively on the Society. However, a stubborn 10 per cent of the resignations from SIGTTO membership over the long term are classified as "passive"; these are failures to renew membership for which there is no discernible cause.

To tackle the problem of retaining those members that fail to renew their association with the Society at fee collection time, an improved membership database and an enhanced member survey form have been introduced. The improved database is highlighting the strengths and interests of each member, enabling the Society to encourage participation in the efforts of its relevant working groups and a more proactive involvement with SIGTTO generally. The new member survey form is aimed at gaining an even better understanding of the needs of the membership.

SIGTTO's enhanced membership marketing effort is a work in progress and Bella is welcoming offers of assistance from all quarters. Please contact marketing@sigtto.org or telephone **+44 (0)20 3941 3263** with any input thought to be useful, from new member prospects to ideas on how SIGTTO's global reach and vast knowledge bank can be put to good use in the marketing drive.

Reasons of resignation

Since 2003 (The year a database was first used by SIGTTO) to present



MEMBERSHIP

Testimonial opportunities

Each issue of *SIGTTO News* features a Member Profile article on the back page where the strengths, milestones and contributions to the gas carrier and terminal industry's safety regime of the chosen member company are highlighted. The profiles also contain details of the company's involvement with the Society's work over the years and outline some of the principal benefits that the company has derived from SIGTTO membership.

The many contributions to *SIGTTO at 40 Years 1979-2019*, the Society's 40th anniversary publication which appeared last year, also showcased the participation of a number of member companies in the affairs of the Society over the past four decades and the mutual benefits that accrue to both individual companies and the industry in general from such a commitment.

As part of the marketing campaign

being coordinated by SIGTTO Marketing Executive Bella Mao and described in the preceding article, the Society is now opening up the opportunity for all member companies to spotlight their experiences of working with SIGTTO and to call attention to some of their capabilities and accomplishments by creating their own website Testimonial page.

As is explained at the top of the main Membership page on the SIGTTO website, "All activities of the Society are centred on the membership. The members form, lead and contribute to the working groups which generate the Society's core output of guidance and recommendations."

Each SIGTTO member has a story to tell the wider world and the new Testimonial page on the website provides the opportunity for companies to raise their profile. If your organisation is interested in submitting a testimonial regarding your journey with SIGTTO and being featured on SIGTTO website, please contact Bella for more details: marketing@sigtto.org

UPCOMING MEETINGS 2020

MEETINGS	DATE	LOCATION
Board Meeting	15 Sep	virtual
81st General Purposes Committee	1 Oct	virtual
Second SIGTTO Webinar	20 Oct	webinar
Board/Annual General Meetings	19 Nov	virtual
Third SIGTTO Webinar	Nov/Dec TBC	webinar

UPCOMING MEETINGS 2021*

MEETINGS	DATE	LOCATION
10th Human Element Committee	21 Jan	London
82nd General Purposes Committee	13 Apr	Athens
65th SIGTTO Panel Meeting	14-15 Apr	Athens
Spring Board Meeting	26 May	London
11th Human Element Committee	July TBC	London
Gastech 2021	13-16 Sep	Singapore
83rd General Purposes Committee	17 Sep	Singapore
Board/Annual General Meetings	Nov TBC	TBC

***ASSUMING AN END TO ALL RESTRICTIONS AND THAT TRAVEL ARRANGEMENTS, ETC ARE BACK TO NORMAL**

CONFERENCES

Gastech goes virtual

The organisers of the well-established Gastech series of conferences and exhibitions successfully pulled off the daunting task of staging a virtual event this year, with speakers, moderators and audience linking in remotely. The Virtual Gastech Summit 2020 was held during the week of 7-11 September and featured 56 presentations in 19 technical sessions. The Summit was staged as a replacement event for the Gastech 2020 Conference & Exhibition which had been planned for Singapore but had to be postponed due to the Covid-19 pandemic.

SIGTTO General Manager Andrew Clifton chaired the virtual event's three technical shipping sessions and provided a wrap-up of these proceedings at the end of the week. Andrew was formally appointed as one of the co-chairs of Gastech's technical sessions in 2019, a responsibility which includes marking and selecting the presentations for the conference programmes from hundreds of submitted abstracts.

The technical shipping sessions of the Virtual Gastech Summit 2020 featured a number of stimulating presentations on new liquefied gas carrier concepts and technologies, reflecting the current era of technical innovation with which the industry is involved. *Suiso Frontier*, the world's first liquefied hydrogen (LH2) carrier and the subject of the first shipping paper, undoubtedly caught everyone's attention and set the tone for the proceedings to follow. *Suiso* is the Japanese word for hydrogen.

The *Suiso Frontier* presentation was jointly prepared by Yukichi Takaoka, senior staff officer of the CO2-free Hydrogen Energy Supply-Chain Technology Research Association (HySTRA), and Ahmer Saeed, site project manager, liquefied hydrogen carrier with Shell. Shell has been working with Kawasaki Heavy Industries (KHI) and ClassNK on the design and construction of the 1,250 m³ vessel for a pilot hydrogen energy supply chain (HSEC) project that the HySTRA consortium will coordinate.

The initiative is being promoted by Japan's New Energy and Industrial Technology Development Organization (NEDO) in anticipation of the growing use of hydrogen in fuel cells. Non-polluting hydrogen is regarded as a fuel of the future and an important element in the drive to slow down and halt the climate change process by achieving net zero atmospheric emissions globally later in the century.

Suiso Frontier will help prove the technical and commercial feasibilities of transporting quantities of hydrogen long distances by sea. Liquefaction of the cargo enables 800



The double-walled cargo tank is installed onboard *Suiso Frontier* at the Kawasaki yard

times the amount of hydrogen to be carried in a tank of a given volume compared what is possible in its gaseous form. However LH2 transport involves major challenges, not least the low carriage temperature of -253°C, the wide flammability range of the product and its small molecule size.

KHI, which has built a considerable number of large and small LNG carriers over the past 40 years, as well as some small shore-based LH2 tanks, has now launched *Suiso Frontier* and installed a horizontal cylindrical IMO Type C cargo tank on the ship. The stainless steel tank is of the double-wall type, with a layer of vacuum insulation between the inner and outer shell.

The pressure build-up design of the containment system will enable the cargo tank to accommodate the rise in pressure due to the generation of cargo boil-off gas (BOG) over the course of the voyage. As a safety precaution *Suiso Frontier* has also been provided with a BOG management system which features a specially designed gas combustion unit (GCU) to handle excess BOG.

Although LH2 has never been transported in bulk by sea before and the International Code for Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code) was not prepared with hydrogen in mind, IMO has taken steps to provide suitable guidance. SIGTTO played a part in drawing up interim guidelines governing the bulk transport of LH2 which were agreed by IMO's Maritime Safety Committee in November 2016 as an attachment to the IGC Code.

During the remaining months of 2020 a series of ship operations are being tested, ranging from initial tank cooldown to loading and discharging, using a newly built pilot LH2 receiving terminal in the Japanese port of Kobe. The vessel's first international seagoing voyage, between Japan and Australia, where the hydrogen will be sourced and liquefied, is planned for early 2021.

The project calls for the hydrogen to be produced from the brown coal mined in Victoria's Latrobe Valley. The aim is to capture and store the carbon dioxide (CO₂) byproduct of the coal processing to ensure that there is no detrimental environmental effect.

For hydrogen to be a cost-competitive fuel of the future, the way LNG is today, a global supply chain backed by a sizeable fleet of large LH2 carriers will have to be realised. Although such a new worldwide liquefied gas trade may still be some years away, the shipping and energy communities will be monitoring the progress being made with the *Suiso Frontier* pilot project. K Line will be operating the ship on behalf of the HySTRA partners.

Other Virtual Gastech presentations dealing with innovative technologies included those on wind-assisted LNGC propulsion; the design of container cargo-handling systems on ships utilised in the carriage of LNG ISO tank containers; LPG carrier emergency shutdown systems; a new approach to LNGC reliquefaction; reducing methane slip in Otto cycle low-speed engines; the use of environment-friendly refrigerants in LPG and ethylene carrier cargo-handling plant; and a new generation of ethane/LNG carriers.



SIGTTO General Manager Andrew Clifton provides a wrap-up of the three Gastech technical shipping sessions he chaired



Senior officers in podium position for a recent pre-Covid session of IMO's Maritime Safety Committee

IMO in the time of the pandemic

The International Maritime Organization (IMO) has 174 Member States, three Associate Members, 80 Non-governmental Organizations (NGOs) with consultative status (of which SIGTTO is one) and 63 Inter-governmental Organizations (IGOs) with observer status.

IMO's Committee and Sub-committee plenary sessions are simultaneously interpreted into six languages and reports are translated into three languages during the meetings. At some of these sessions there can be as many as 1,000 people in attendance, coming from every conceivable corner of the globe and bringing a wealth of knowledge and experience to bear on safety and environmental issues affecting the global shipping industry.

Facilitating such meetings is a massive challenge at the best of times. The robust administrative system that has been established to meet this challenge is smoothly executed by IMO's professional Secretariat staff, diligently led by Secretary-General Kitack Lim.

The Covid-19 pandemic has provided a new, added level of challenge. The virus has severely disrupted IMO's normally busy work programme, with scheduled meetings from March 2020 through the summer having been postponed.

Several extraordinary meetings of the IMO Council have been held by correspondence to discuss the way forward in these extraordinary times. It has been decided that no physical meetings will be held this year and that formal online meetings will commence from September 2020. Organising these online meetings to the satisfaction of everyone concerned will be no easy task for a global agency such as IMO, given the number of time zones involved and the simultaneous interpretation requirements.

Some meetings postponed from earlier this year, such as the 102nd Session of the Maritime Safety Committee (MSC 102) and the 75th Session of the Marine Environment Protection Committee (MEPC 75), will be held in the last quarter while others have been pushed forward to next year.

SIGTTO is pleased that MSC 102 will now go ahead in November in "virtual" form where its paper proposing a new output for a focused review of the International

Gas Carrier (IGC) Code will be discussed.

However, this year's scheduled 7th Session of the Sub-committee on Carriage of Cargoes and Containers (CCC 7) has been postponed. This means that further discussions on issues such as enclosed space entry (and cargo compressor rooms) and IGC Code Unified Interpretations will have to wait until next year.

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MEMBER PROFILE

MOL brings wealth of experience to bear

Mitsui OSK Lines, Ltd (MOL) can trace its history back to 1878 when the iron-hulled steamer *Hideyoshi Maru* began transporting Miike coal from Kuchinotsu in Japan to Shanghai. Then, in 1884, the establishment of Osaka Shosen Kaisha (OSK Line) laid the foundation of the company's 135-year journey. MOL is now a multimodal transport group that meets diverse transport needs with one of the world's largest merchant fleets, of 816 vessels, and a comprehensive approach to safety and innovative technology.

In tandem with the growth in the global demand for energy over the past half century, MOL has developed its energy transport business on a worldwide scale, backed by the world's largest fleet, a track record of success and decades of know-how.

The energy transport sectors, including crude oil and LNG, require advanced technological capabilities and the company provides targeted education and training programmes to ensure seafarers fully understand the relevant technical principles. Covering both hardware and software aspects, MOL's rigorous safety system underpins the safe and reliable delivery of energy supplies.

Demand for LNG continues to increase, due not least to its attractions as an environment-friendly, clean energy source. MOL has accumulated considerable expertise in LNG transport since it became involved with the sector in 1984 on delivery of its 125,835 m³ LNG carrier *Senshu Maru*. Today, MOL is at the forefront of LNG carrier ownership, management and operations. As just one example of its innovations in this sector, in 2018 MOL became the first Asian shipping company to operate an icebreaking LNG carrier for the Yamal LNG project and pioneer LNGC voyages on the Northern Sea Route.

MOL manages its approximately 70 LNG carriers through six companies around the globe, in Tokyo, London, Hong Kong, Jakarta, Muscat (Oman) and Arzew (Algeria), and also owns and operates LPG tankers. In 2016, building upon its LNG and LPG carrier experience, it began operating the world's first very large ethane carrier in a strategic tie with Reliance Industries Ltd in India.

MOL is also utilising its strong track record of success in energy transport to move into new offshore businesses such as floating production, storage and offloading units (FPSOs) and floating storage and regasification units (FSRUs). The company entered the oil FPSO business in 2010, and now participates

Mitsui OSK Lines began its involvement with the FSRU sector in 2017 when MOL FSRU Challenger was delivered



in nine projects off the coast of Brazil, one off Ghana and one off Mexico.

In 2017 MOL became the first Asian shipping company to take delivery of an FSRU, the 273,000 m³ *MOL FSRU Challenger*. Currently in service in Turkey, this vessel is destined for a long-term LNG import project in Hong Kong. Proactive in both the larger and small-scale FSRU segments, MOL is now also involved with FSRU projects in India, Indonesia and Germany.

Recently, a new segment of 'floater' technology has come into focus for MOL and this is the power-ship business. The company's new joint venture with Turkish partner Karadeniz is based on the concept of a floating gas-fired power plant being supplied by an LNG vessel and an FSRU to enable a unique gas-to-power solution to be deployed quickly and economically.

MOL is also combining its LNG transport, floating LNG and power concepts with the secondary businesses of small-scale LNG carrier operations, LNG bunkering and LNG trucking to provide a full service package for its customers in the LNG sector. The provision of these services, linked with a growing emphasis on renewable energy solutions, will be a key focus for MOL going forward as part of the global drives to supply clean energy and reduce environmental pollution.

MOL's involvement with SIGTTO activities stretches back to the Society's inception four decades ago. The company is a member of the SIGTTO Board and its staff actively participates in the work of the Society's General Purposes and Human Element Committees (GPC and HEC). Steve Allibone, general manager – competency assurance with MOL LNG Transport (Europe) Ltd, reports, "The company has been engaged in HEC activities since that body's formation in 2016 and in 2019 I took the chair of the Committee. A number of HEC working groups have been established and the Committee's first publication, *Recommendations for Management of Cargo Alarm Systems*, is set

to be followed by many more. I am gratified to be involved in the drafting of these new SIGTTO human element publications."

During its long association with the SIGTTO membership MOL has benefited from meeting all the like-minded industry figures who strive for an incident-free future for the liquefied gas shipping and terminal businesses. "The knowledge shared between SIGTTO members has been of immense value to both individual companies and the industry as a whole," states Kenta Matsuzaka, managing executive officer at MOL and one of the SIGTTO Board members. "As technology continually changes, it is important that experiences are shared and lessons learned for the benefit of all members. MOL looks forward to its continuing participation in SIGTTO and sharing its own great experience of the liquefied gas industry with the membership."

SIGTTO

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Editor: Mike Corkhill

SIGTTO Contact: Erin Rydings
Administrative Assistant
reception@sigtto.org

Advertisement Sales: Ian Pow,
Riviera Maritime Media Ltd
ian.pow@rivieramm.com

Design: jezharrisdesign.com

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