



From the Archives (p6) New SIGTTO Office (p9) Member Profile (p12)

SIGTTO NEWS

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MESSAGE FROM GENERAL MANAGER



SIGTTO settles in at new office

SIGTTO General Manager Andrew Clifton describes the achievement of finding suitable accommodation for a growing organisation

For the SIGTTO Secretariat, 2018 has been completely dominated by our office move. We have relocated to 42 New Broad Street, only about 300 metres away from our previous home in St Helen's Place. We remain within the famous square mile of the City of London's financial district and very close to Liverpool Street Station. We thus also remain within the traditional shipping area of the city.

The London Liaison office officially moved on 23 July 2018 after several weeks of outfitting and we are settling into our new home at the time of writing!

The new premises are considerably larger than St Helen's Place. The extra space not only allows for more staff, as per SIGTTO's Strategic Plan, but also provides for a much larger meeting room. Such a space will enable meetings of various Society bodies, such as the Human Element Committee (HEC) and working groups, to take place in SIGTTO's own premises. We were not able to accommodate such gatherings in our previous office.

When we started the search for new premises in earnest back in January 2018, we had a vision of what the perfect office should be for the Society as it moves ahead in the service of a very dynamic and rapidly growing maritime sector. Many office locations within the city were viewed and rejected for any number of reasons. The final choice ticked all the boxes and we were very pleased to sign the lease at the end of March.



Andrew Brown of Smit Lamnalco addresses SIGTTO's 64th Panel Meeting in April 2018

"We now have not only a much larger meeting room able to accommodate a range of SIGTTO internal meetings but also a significant library space and a staff eating area."

Design and outfitting then commenced and this was completed at the end of June.

The new office has a large library area, complete with a GTT "mock-up" of both the Mark III and NO96 membrane containment systems. There is also a staff eating area and a break-out room.

The finished office has exceeded all expectations and we look forward to

welcoming our membership whenever they are attending future meetings on the premises or visiting London. I am confident this office, pictures of which are on page 9, will serve the Society well for many years to come. >

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MESSAGE FROM GENERAL MANAGER

“With the publication of the latest two documents, SIGTTO has delivered eight paid publications in the past four years.”



The SIGTTO board met for its spring 2018 meeting on the Isle of Man

and Nikolaos Panagiotakopoulos have also recently left SIGTTO to pursue other opportunities.

We thank all three for their efforts for the Society in the past and wish them all the very best for the future. We are pleased to welcome Erin Rydings to the Secretariat in the role of receptionist/administrative support. Further details of new staff will be made in the next issue of SIGTTO News.

SIGTTO's Human Element Committee (HEC) and the General Purposes Committee (GPC) continue their good work, chaired by John Adams (Teekay) and Mark Hodgson (Shell), respectively. A summary of the recent progress made by the working groups serving under the two bodies is given on page 5.

> SIGTTO's major event this year has been the 64th Panel Meeting. Kindly hosted by Smit Lamnalco, the event took place in London on 11-12 April and was augmented by a technical visit to HR Wallingford in Oxfordshire. Attendance and participation at the 64th Panel Meeting were excellent and the Secretariat has since received a significant amount of positive feedback about the content and organisation of the event.

We are now looking forward to Gastech 2018 in Barcelona in September where SIGTTO and Witherbys, our publishers, intend to share a much larger exhibition stand than has previously been the case.

This December we will be hosting the fourth Liquefied Gas Senior Executive Forum in Houston, in tandem with the US Coast Guard and the Society for Gas as Marine Fuel (SGMF), and with further assistance from Riviera Maritime Media.

So far in 2018 SIGTTO has held Regional Forums in Oslo, Singapore, Athens and Houston, while further such Forums are planned for Buenos Aires, Tokyo, Houston, Perth, Shanghai, the Middle East and Europe over the remainder of the year. Meetings still to come are listed in the adjacent SIGTTO events table.

At the time of going to press the Society is publishing its latest two publications, *“Ship/Shore Interface for LPG/Chemical Gas Carriers and Terminals”* and *“Guidelines for the Alleviation of Excessive Surge Pressures on ESD for Liquefied Gas Transfer Systems”*. More information on the documents, which are the seventh and eighth paid publications delivered by the Society in the last four years, is given on page 9 of the Spring 2018 issue of SIGTTO News.

The SIGTTO Secretariat has recently experienced some staff changes. Bobby Steele has returned to ExxonMobil after almost three years on secondment and has taken up a role for the company based in Houston. Andrea Stone (Baseley)

UPCOMING MEETINGS 2018

MEETINGS	DATE	LOCATION
Gastech 2018	17-20 Sep	Barcelona
78th General Purposes Committee	21 Sep	Barcelona
South American Regional Forum	9 Oct	Buenos Aires
Tokyo Regional Forum	8 Nov	Tokyo
Autumn Board & AGM	28 Nov	Doha
Pan American Regional Forum	3 Dec	Houston
4 th SIGTTO/USCG/SGMF Senior Executive Forum	4 Dec	Houston
Perth Regional Forum	11 Dec	Perth
Shanghai Regional Forum	14 Dec	Shanghai
Middle East Regional Forum	TBC	TBC
Western Europe Regional Forum	TBC	TBC

UPCOMING MEETINGS 2019

MEETINGS	DATE	LOCATION
79 th General Purposes Committee	1 Apr	Shanghai
LNG 2019	1-5 Apr	Shanghai
Spring Board Meeting	22 May	San Ramon
Gastech 2019	16-19 Sep	Houston
80th General Purposes Committee	20 Sept	Houston
Autumn Board & AGM	19 Nov	Kuala Lumpur



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GENERAL PURPOSES COMMITTEE WORKING GROUPS

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

Floating LNG installations

The GPC has established a subsidiary body – the Sub-Committee for Floating LNG Installations – with the task of considering the many aspects of the rapidly expanding fleet of floating LNG regasification, storage and production vessels. The Sub-Committee held its inaugural meeting in February 2018 and gathered once again in May. At these sessions the Sub-Committee's terms of reference (ToR) were completed and approved.

The Sub-Committee also identified three specific areas where participants in the floating LNG sector would derive benefit from the speedy availability of industry best practice guidelines. To launch its work programme the Sub-Committee established three working groups to focus on developing the initial sets of required guidelines.

Working Groups 1, 2 and 3 for Floating LNG Installations are dealing with topics relating to the site assessment, design criteria and operational guidance, respectively, as they relate to nearshore/offshore floating LNG assets. All three had kick-off meetings in March and July 2018 when ToRs were completed and approved and workload assignments were launched. Chair persons of Working Groups 1, 2 and 3 are, respectively, Andrew Brown of Smit Lamnalco, Stuart Thomson of BP and Excelerate Energy's Jeff Meadows.

Propulsion and reliquefaction

The Propulsion and Reliquefaction Working Groups met face to face at the 77th meeting of the General Purposes Committee (GPC 77) in London in April 2018. The two bodies have also gathered several times since then using internet-based meeting solutions.

With both diesel and steam turbine propulsion systems under review, the Propulsion Working Group is charged with upgrading existing industry best practice guidelines as a result of recent technology advances. The review programme of the Reliquefaction Working Group has a similarly broad scope, with both LNG and LPG reliquefaction systems being addressed.

The Propulsion and Reliquefaction Working Groups have both built detailed tables of contents, based on the polling of GPC members, that will be presented at GPC 78 in September 2018 for approval. Once these are approved, the working groups will proceed to develop the documents. The documents will

include technical descriptions, with sections on risk, operations and safety. They will provide recommendations, guidelines and best practices for all the propulsion and reliquefaction systems under consideration. Kenny English of BP Shipping chairs both working groups.

Gangways

The Gangways Working Group was put together to provide guidance for designers, terminals, vessel owners and operators on safe landing areas and gangway operations. The risk factors involved in assuring the safety and operation of gangway systems are also being addressed.

The working group is halfway through the preparation of its publication, and the aim is to present a finished document for approval at GPC 79 in April 2019. Amongst notable achievements is the recent development of a bowtie risk evaluation methodology addressing gangway risk for use in the document. The Gangway Working Group is chaired by Rick Boudiette of Angola LNG.



SIGTTO has convened three floating LNG installations working groups, to consider site assessment, vessel design and operations

HUMAN ELEMENT COMMITTEE WORKING GROUPS

The following paragraphs provide updates of progress being made by currently active working groups established under the auspices of the SIGTTO General Purposes Committee.

Cargo control room ergonomics

Comprised of shipowners, class societies and system manufacturers, the Cargo Control Room (CCR) Ergonomics Working Group is considering "alarm flooding" as an initial topic. An alarm flood is a condition during which the alarm rate is greater than the operator can effectively manage, e.g. more than 10 alarms per 10 minutes. The results of the working group's efforts will build on the guidance given in the *IMO Code on Alerts and Indicators, 2009* and *IEC 62682 - Management of alarm systems for the process industries*.

Chaired by Ray Gillet of GTT Training, the CCR Ergonomics Working Group has met six

times, most recently in June 2018. Once the work on the alarm flooding topic is complete, the working group will look at the layout of information on cargo control room screens, including the names, legends and colours used to convey information to the operator.

Gap analysis of competency guidelines

The Society has established a Task Force for the Gap Analysis of SIGTTO Competency Guidelines. Earlier this year an initial meeting was held, at which gap assessment reviews of four SIGTTO competency publications were carried out. The introduction of new technologies in the LNG industry has resulted in a need to revise relevant parts of the Society's competency guidelines, and the exercise presents an ideal opportunity for gap analyses, to determine how actual performance compares with potential or desired performance.

The four completed gap assessment reviews were presented to the Human Element Committee at its fifth session (HEC 05) in July 2018. At this gathering it was decided that the task force would evolve into a working group to progress the update of the four competency publications. Steve Allibone of MOL LNG Transport has been appointed to chair this new WG.

Shore staff competencies

The terms of reference governing the scope of its work programme were agreed at first meeting of the Working Group for Shore Staff Competencies, held earlier this year, and were approved at HEC 05. Specific topics to be covered include shore staff competencies for gas carrier owners/operators and marine terminal personnel. Dr Linda Sørensen of BW Gas is chairing this WG.

Nakilat has come a long way in a short time

There have probably been more words written about Nakilat than any other LNG carrier owner. Amongst many notable achievements, the company owns 31 Q-Flex ships of around 216,000 m³ and 14 Q-Max ships of 266,000 m³. The largest LNG carriers ever built, these vessels helped Qatar quickly rise through the ranks to become the world's leading exporter of LNG.

Yet Qatar Gas Transport Co Ltd, or Nakilat, is only 14 years old, having been established in 2004 to manage the shipping of Qatar's LNG and associated products to world markets.

Since taking delivery of its first LNG carrier, the 145,700 m³ *Maran Gas Asclepius*, in 2005 Nakilat has built up a fleet of 70 fully and part-owned gas carriers, comprising 65 LNGCs, four LPGCs and one floating storage and regasification unit (FSRU). For the vessels with shared ownership, Nakilat is partnering with a number of the world's leading gas shipping companies, including Maran Gas, Teekay, K Line, Pronav, NYK Line, Mitsui OSK Lines, Shipping Corporation of India and Excelebrate Energy.

Construction of the Nakilat Q-Flex and Q-Max ships was shared between Samsung Heavy Industries, Hyundai Heavy Industries and Daewoo Shipbuilding & Marine Engineering (DSME). Between them, the three Korean yards commissioned the full 45-ship complement between October 2007 and August 2010 in one of the most formidable shipbuilding achievements ever recorded.

Over the years the Q-Flex and Q-Max



Mekaines is one of the 14 Q-Max LNG carriers in the Nakilat fleet

vessels have brought significant economy of scale benefits to not only their owners and charterers but also the gas buyers. When the 216,200 m³ *Al Gattara*, one of the first two of the Q-Flex and Q-Max ships to be delivered, discharged a full shipment at the Niigata terminal in Japan on its inaugural voyage in December 2007, it was the largest LNG cargo ever transported by sea.

In 2017 around 78 million tonnes of LNG was loaded at Ras Laffan, Qatar's mammoth LNG production complex. The volume was 40% ahead of the exports of Australia, it's nearest rival, and equal to 26.6% of the global trade in the product. Nakilat's ships lifted two-thirds of these export cargoes, delivering them to more than 90 receiving terminals across 26 countries worldwide.

Back in 2006 Nakilat established a strategic alliance with Shell International Trading & Shipping Company Ltd (STASCO) to manage its wholly owned fleet of 14 Q-Max and 11 Q-Flex LNG carriers. Built into this agreement was an understanding that the vessels would eventually be returned to Nakilat in-house management.

Nakilat Shipping Qatar Ltd (NSQL) was established in 2012 as a ship management subsidiary, and activities commenced with the oversight of four LPG carriers, followed by four Q-Flex LNG carriers in 2014. Throughout 2016 and 2017 another 10 LNG carriers were transitioned in-house from STASCO. Today NSQL is responsible for the management of 18 gas carriers, comprising four LPGCs, six Q-Max ships and eight of the Q-Flex class.

Nakilat welcomed the first FSRU to its fleet in June 2018 when it established a joint venture with Excelebrate Energy and took a 55% stake in the 150,900 m³ FSRU *Exquisite*. Nakilat continues to explore opportunities in LNG regasification, power generation and small-scale LNG in the drive to expand its business portfolio. The initiative accords with the company's vision to be a global leader and provider of choice for energy transportation and maritime services.

Nakilat became a member of SIGTTO in January 2007. The company sits on both the Society's Board of Directors and the General Purposes Committee and has supported many of the projects and working groups with which SIGTTO has been engaged over the years.

► NAKILAT FLEET OVERVIEW



70 FLEET
VESSELS STRENGTH



114,449,535m³
VOLUME OF LNG SHIPPED IN 2017



608
CARGO DELIVERIES IN 2017



2,862,012 NM
TOTAL NAUTICAL MILES (NM)

The special case of LNG bunker vessels

In an interesting presentation to delegates attending SIGTTO's 64th Panel Meeting in London in April 2018, Hans-Christian Haarmann-Kühn of TGE Marine Gas Engineering explained the special capabilities required of LNG bunker vessels (LNGBVs), over and above the attributes of similar-sized small-scale LNG carriers.

For a start, LNGBVs can be called upon to supply LNG fuel to a variety of different bunker tank arrangements on the gas-fuelled vessel. The receiving system could be either a vacuum-insulated pressure build-up tank; semi-pressurised storage with boil-off gas (BOG) compressors; or a fully refrigerated storage tank, of the membrane type, for example, when large volumes of LNG bunkers are being carried.

Of even greater variety is the range of different vessel types and sizes that can require fuelling, each with its own manifold arrangement and a set time window for transfer operations. As LNGBVs will be designed around the needs of the biggest potential customer, questions then arise about the ability of fuelling manifolds on smaller LNG-powered ships being serviced to accommodate high-capacity transfer equipment.

In most operating scenarios the LNGBV will be required to provide its services in a timely and efficient manner.

The 5,800 m³ LNG bunker vessel *Coralius* cooled down the LNG bunker tanks on the 37,300 m³ ethane carrier *Navigator Aurora* and transferred 500 tonnes of LNG in this ship-to-ship fuelling operation outside Gothenburg



In addition, it may be called upon to support special operations such as gassing up, cooling down, inerting and the discharge of residual fuel gas.

Also, LNGBVs may have to offer a back-up service as a feeder LNG carrier, on the one hand, and deal with long idle periods from time to time on the other.

Such is the nature of fuelling operations that the bunker vessel is earning its keep when transferring LNG. However, every aspect of the transfer operation results in some heat ingress into the system and this incoming heat, and the resultant gas vapour that is generated, has to be managed in some way.

The options for heat management are burning the vapour in a gas combustion unit (GCU); reliquefying it in an energy-intensive reliquefaction plant; and allowing pressure build-up in either the ship's bunker tank or on the LNGBV.

In summarising the status of this new breed of gas ship, Mr Haarmann-Kühn told those attending SIGTTO's 64th Panel Meeting that LNGBVs are highly specialised small gas carriers. The service that they offer requires new processes and a high degree of flexibility to handle the broad range of operating conditions that will be encountered.

Some initial rules and standards for LNGBV and LNG bunkering interfaces and processes have been developed but this body of work needs to be further developed, aided by the experience gained by the nascent and growing fleet of purpose-built LNGBVs. The majority of the new breed of LNGBVs, in service and on order, are in the 5,000-7,500 m³ size range.

What is inescapable is that the performance required of an LNGBV is more demanding than that a similar-sized LNG carrier engaged in coastal distribution duties is called on to provide.

NEW MEMBERS

Quartet joins the club

Four companies have joined the Society's membership so far in 2018. The new members and their date of joining the Society are shown below. The SIGTTO membership now stands at 141 full members, 47 associate members and 27 non-contributory members.

Rimorchiatori	
Riuniti Spezzini	1 Mar 2018
Toshiba America LNG Corp (TAL)	1 Apr 2018
Kuwait Integrated Petroleum Industries Co (KIPIC)	1 Apr 2018
Commonwealth LNG	1 Aug 2018

Rimorchiatori Riuniti Spezzini provides tug services in the Italian port of La Spezia, home to GNL Italia's Panigaglia LNG import terminal. Panigaglia is one of Europe's oldest LNG receiving facilities, having opened for business in 1971. Rimorchiatori

Riuniti Spezzini operates 10 tugs and various of these vessels assist gas carriers with transits of the port approaches and berthing operations at the terminal jetty.

Based in Houston, Texas, **Toshiba America LNG Corp (TAL)** was established as an operating company in 2017 by Toshiba America Inc to coordinate and assemble the infrastructure chains that result in the production of US LNG for export. This LNG can then be marketed internationally by the broader Toshiba group. Toshiba is a manufacturer of power-generating equipment and has expanded its energy product offering through the sale of LNG from US export terminals. As an initial step, TAL signed up as one of the five tolling customers for the Freeport LNG export project in Quintana, Texas.

Kuwait Petroleum Corporation (KPC) has established **Kuwait Integrated Petroleum Industries Company (KIPIC)**

as a new subsidiary to manage refinery, petrochemicals and LNG import operations at the new Al-Zour industrial complex in southern Kuwait. The LNG import terminal is being built on reclaimed land and will be provided with eight 225,000 m³ storage tanks, two marine jetties and regasification facilities able to process up to 22 million tonnes per annum (mta) of LNG.

Commonwealth LNG is developing an 9 mta LNG export project at the mouth of the Calcasieu River in the US state of Louisiana. The plan calls for eight mid-scale liquefaction trains of the single mixed refrigerant (SMR) type, six storage tanks of 40,000 m³ each and a marine jetty able to accommodate LNG carriers in the 10,000-215,000 m³ size range. Pending a successful outcome of the current permitting process, Commonwealth LNG is seeking to give the project a green light in spring 2019 to enable exports to commence in spring 2022.



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SIGTTO OFFICE - The new premises at 42 New Broad Street



CLOCKWISE FROM TOP RIGHT: 1. Welcome to SIGTTO's New Home 2. Room For Conferences 3. Ship-Shape Galley Facilities 4. World At Our Fingertips 5. Ask For No 42 New Broad Street 6. Ship/Shore Interface 7. Models Stretch Out 8. Library Containment System

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Recent gas-related developments at IMO

Fire protection

IMO's Sub-committee on Ship Systems and Equipment met for its fifth session (SSE 5) early this year and considered several submissions concerning gas carriers. A proposed Unified Interpretation (UI) suggesting limiting the scope of installation testing for dry chemical powder fire-extinguishing systems on gas carriers, as required by paragraph 11.4.8 of the International Gas Carrier (IGC) Code, was rejected.

Another UI, dealing with the definition of "cargo area" in IGC Code 11.1.4 for the purposes of firefighting arrangements, was accepted. It was agreed that when there is a fuel tank adjacent to the cargo area, the weather deck area above should be considered as "cargo area", in the same way that a void space or ballast tank would be.

SSE 5 also considered the new work programme item which is the revision of *Guidelines for the approval of fixed dry chemical powder fire-extinguishing systems for the protection of ships carrying liquefied gases in bulk (MSC.1/Circ.1315)*. It was agreed that sodium bicarbonate-based powders should be excluded from use as dry chemical powder on ships carrying liquefied gases in bulk.

However, it was further recognised that all dry chemical powders in use were mixtures (containing additives in traces) and that a single compound dry powder did not exist. Therefore, it would be necessary to further develop criteria according to which a dry powder could be considered as a sodium bicarbonate powder (e.g. mass percentage of the main compound), as opposed to a sodium-based dry powder.

It was also agreed that dry chemical powder other than sodium bicarbonate should be approved by the relevant flag administration in accordance with recognised international standards; and that a specific fire-extinguishing capability test might be necessary within the Guidelines.

A correspondence group was formed to progress the work intersessionally to:

- (a) develop draft acceptance criteria for dry chemical powders in terms of fluidity, moisture behaviour and suitability for use on board ships carrying liquefied gases in bulk, with a view to establishing performance and testing requirements;
- (b) develop draft acceptance criteria for dry chemical powders in terms of fire-extinguishing capabilities, with a view to establishing performance

and testing requirements; and

- (c) identify available standards and best practices relevant to the maritime sector, as well as possible gaps in the existing international regulations.

Greenhouse gas emissions

In April 2018, at its 72nd session, the Marine Environment Protection Committee (MEPC 72) adopted the *Initial IMO Strategy on reduction of GHG emissions from ships*, the most notable aspect being the "levels of ambition", expressed as:

“.1 carbon intensity of the ship to decline through implementation of further phases of the energy efficiency design index (EEDI) for new ships

to review with the aim to strengthen the energy efficiency design requirements for ships with the percentage improvement for each phase to be determined for each ship type, as appropriate;

.2 carbon intensity of international shipping to decline

to reduce CO₂ emissions per transport work, as an average across international shipping, by at least 40% by 2030, pursuing efforts towards 70% by 2050, compared to 2008; and

.3 GHG emissions from international shipping to peak and decline

to peak GHG emissions from international shipping as soon as possible and to reduce the total annual GHG emissions by at least 50% by 2050 compared to

2008 whilst pursuing efforts towards phasing them out as called for in the Vision as a point on a pathway of CO₂ emissions reduction consistent with the Paris Agreement temperature goals."

IMO will now continue to work on possible measures to achieve this ambition at future sessions of MEPC.

Global sulphur cap 2020

IMO is developing guidelines for the *Consistent implementation of regulation 14.1.3 of MARPOL Annex VI* and work continued during an intersessional meeting in July 2018. The scope of the guidelines includes preparatory and transitional issues that may arise with a shift from the 3.50% m/m sulphur limit in ship fuel to the new 0.50% m/m limit by 1 January 2020; impact on fuel and machinery systems that may result from the use of fuel oils with a 0.50% m/m sulphur limit; verification issues and control mechanisms and actions that are necessary to ensure compliance and consistent implementation; and development of a draft standard format (a standardised system) for reporting fuel oil non-availability.

The Oil Companies International Marine Forum (OCIMF) and the International Petroleum Industry Environmental Conservation Association (IPIECA) informed the intersessional meeting that, to assist with safety aspects of the transition, they are facilitating the development of industry safety guidelines for submission to IMO.

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
- Submitting proposals for projects and studies to the General Purposes and Human Element Committees

- 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
- 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 LNGwebinfo portal for updated LNG information as required to conduct compatibility studies. This information is restricted to members of SIGTTO and GIIGNL only

Enagás ahead of the terminal flexibility curve

Spain is set to be the focus of the global gas shipping and terminal industry's attention as upwards of 30,000 delegates, exhibitors and visitors descend on Barcelona for the Gastech 2018 event on 17-20 September. Six of the country's leading gas industry players have come together as the Spanish Gastech Consortium to host the gathering. One of the companies, Enagás, is a SIGTTO member.

Owning more than 12,000 km of gas pipelines and three strategic storage sites, Enagás is Spain's premier natural gas transmission company and also the technical manager of the country's gas system. In addition, it is accredited as an independent transmission system operator (TSO) by the European Union.

Enagás also has the largest number of LNG receiving terminals and the highest regasification capacity in Europe. The company part or fully owns eight LNG terminals, comprising six in Spain, one in Mexico and one in Chile. Furthermore, Enagás is partnering with Swedegas in the development of a small-scale LNG bunkering facility in the port of Gothenburg.

The company's six Spanish regasification terminals are at Barcelona, Sagunto, Cartagena, Huelva, Gijon and Bilbao. The oldest of these facilities, Barcelona, has been in operation since 1969. It is also the country's largest such facility, with six storage tanks and an aggregate capacity of 760,000 m³.

For Enagás, the acquisition of a stake in Mexico's Altamira facility in 2011 was the first involvement with LNG terminals outside Spain. This foray was followed in 2012 by the purchase of a stake in the GNL Quintero terminal in Chile.

All the Enagás LNG import terminals in Spain offer open access truck loading services, to enable customers not connected to the national grid to be provided with natural gas. The filling of cryogenic road tankers at a number of key points across the country has enabled the establishment of a liquid and flexible small-scale LNG market in Spain. This activity started in 1970 and in recent years aggregate annual LNG truck loadings at Enagás terminals have topped the 45,000 mark.

"The global LNG market is now much more diversified than it was in the past, with many new gas buyers and sellers, sales contracts of shorter duration and a much more active spot market," states Francisco de la Flor, international

Like all the Enagás terminals in Spain, Huelva offers vessel reloads and truck loading as additional services



organisation director at Enagás. "We have been to the fore in providing our customers with the increasingly flexible array of services they require.

"Our terminals were amongst the first to be adapted, more than two decades ago, to enable the reloading of cargoes, for shipment to markets where the demand for gas is great and buyers are willing to pay a premium. In 2014, when global reloads of LNG cargoes peaked, Spanish terminals handled two-thirds of the volume."

The ability of Spanish terminals to reload cargoes has now been extended to enable the filling of small LNG carriers as well as conventional-size ships. This capability has put the terminals in a good position to provide a new service set to expand rapidly – the loading of LNG bunker vessels that can then fuel a growing fleet of LNG-powered vessels.

"We have found our membership of SIGTTO invaluable as we develop our service portfolio," continues Mr de la Flor. "The sharing of experiences and industry best practices amongst the world's gas tanker and terminal operators enhances not only our participation in the other LNG-related international organisations with which we are involved but also the likelihood of positive, unified outcomes.

"Going forward, Enagás, SIGTTO and the gas shipping and terminal industry in general face some intriguing challenges, not least achieving the ambitious decarbonisation and climate change targets that have been set," concludes Mr de la Flor. "The industry needs to work in

harmony to achieve these goals, and LNG has a unique role to play as a fuel in the maritime sector. Our industry also has an important part to play in the transition towards a renewable future, as we help facilitate the development of gas renewables such as hydrogen, biogas and bioLNG and their associated logistics chains."

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