

TANK STORAGE

TERMINAL OUTLOOK 2023

11 leaders in the tank storage sector share their predictions for the industry in 2023 and beyond

ALLEVIATING CONGESTION

Olivia Energy Group reveals their latest terminal expansion in the port of Cadiz

SERVICE & CERTIFICATION

An exclusive look at Stolthaven Moerdijk and the facility's leading global certifications



The image features a large, close-up photograph of a white daisy flower with a bright yellow center, set against a vibrant blue background. The flower's petals are detailed and layered, creating a sense of depth. In the top left corner, the word "exolum" is written in a lowercase, sans-serif font, with "exo" in blue and "lum" in green. The overall composition is clean and professional, suggesting a focus on nature and growth.

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HAPPY NEW YEAR!

► **AS WE** round out the year 2022, there's been lots of news coming from the EU regarding oil price caps and concern over low demand. While inflation is certain to have an impact on the industry (and we've got plenty of analysis on the situation on pages 44 and 45), I'm confident that 2023 is going to be an exciting year for the tank storage industry.

And one big opportunity on the horizon is the energy transition and future fuels industry. At *Tank Storage Magazine*, we've seen first-hand how tank storage facilities are preparing for the new market, whether it's by storing new fuels, building solar farms to generate their own electricity or just updating their ESG policies.

A special thanks to Oikos Storage, based here in the UK, for inviting the team to tour their facility. Along with new recruit, Gary Kakoullis, Molly, Cyann and I visited the terminal, based in Canvey Island. We were given the opportunity to visit both jetties – one newly built in 2018 – and compare the evolution from a more manual process to a practically fully-automated loading and unloading system.

But even with all these fantastic innovations, it was still a struggle to find protective clothing to fit two petite women. Perhaps that's one avenue the industry can look at to encourage more gender equality on the ground...

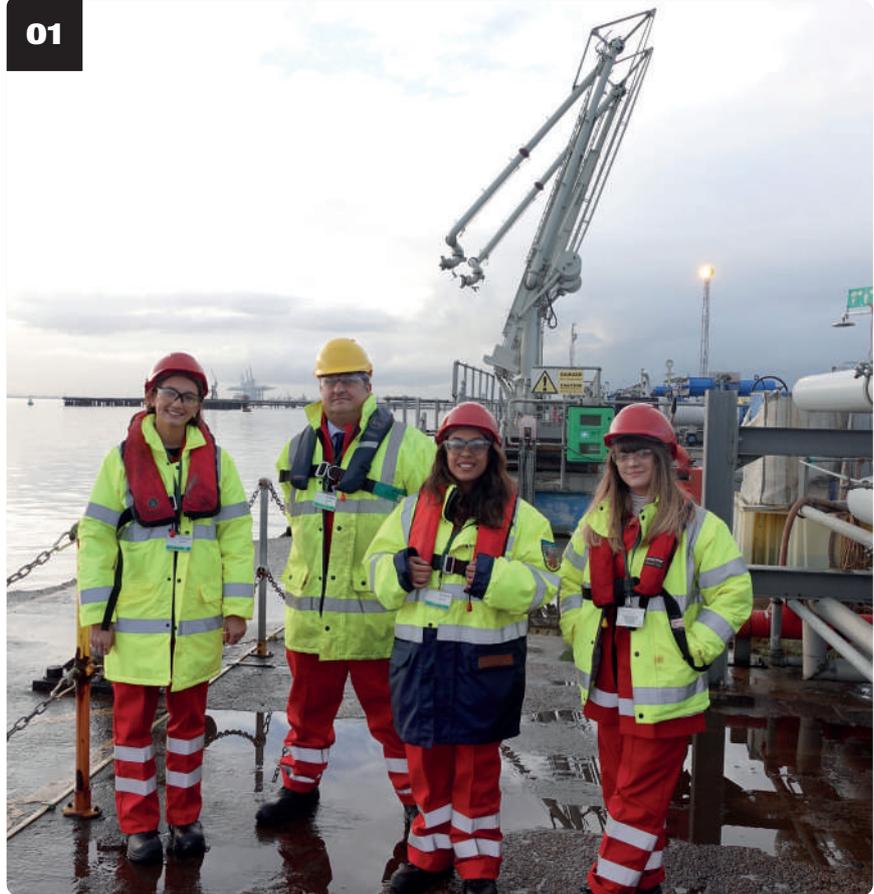
But the trip to Oikos Storage was certainly eye-opening, and terminal manager Arun Sriskanda has shared his overview of the year in our Terminal Outlook. Starting on page 26, we've rounded up commentary from 11 terminal operators, featuring experts from Advario, Exolum and LBC Tank Terminals – to name a few. They're facing the same issues as you and will also explore the potential opportunities that come with such a rapidly-changing market.

We've got an exclusive interview with those on the ground at Slot Haven Moedijk (page 36), leading the charge on creating sustainable places to work. Plus, Olivia Energy Group explains the rationale behind the expansion of its terminal at Port of Cadiz (page 35).

As well as our exclusive interviews with terminal operators, we've got an excellent innovation round-up on page 48, showcasing the best in drones, robotics and laser tech to help you run your terminal; more safely and efficiently.

And if that taster of robotics innovation isn't enough for you, there's a preview of

01



the brand new StocExpo event on page 67, featuring a robotics playground for attendees to test out the latest gadgets. Back with a bang for 2023, StocExpo is going to be packed with new features, so make sure you're registered to attend on 14-16 March!

For now, though, enjoy this latest edition of *Tank Storage Magazine* packed with plenty of exclusive interviews, original commentary and editorial features from our team of journalists. Happy holidays!

Best wishes,

Anamika

01 Team TSM at Oikos Storage
(L-R: Molly Cooper, Gary Kakoullis,
Anamika Talwaria, Cyann Fielding)



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TERMINAL NEWS: EUROPE

Europe

ALKION TERMINALS AND KOOLE TERMINALS MERGE

As of 17 November, Alkion Terminals and Koole Terminals are officially one group, working together toward a more sustainable future. With 20 terminals in seven countries, 900 employees and a total capacity of 5.3 million m³, Alkion Terminals and Koole Terminals have significantly increased their potential together.

The new organisation aspires to become the European market leader in innovative and integrated services for storage, processing, and logistics.

'With this acquisition, we are joining forces,' says John Kraakman, CEO of Koole Terminals. 'Alkion and Koole are highly complementary, and our joint expertise now gives us the knowledge

and skills to further develop and innovate our services in the storage market.'

Kraakman continues: 'It's a new starting point that offers opportunities for a successful and sustainable future for all of us, and we are creating that future together, in which service to our customers is maintained to the highest possible standards for both quality and safety.'

For the time being, the names Alkion Terminals and Koole Terminals will be kept as they are.

UK



ESSAR OIL UK TO BUILD CCS FACILITY

Essar Oil UK has announced its plan to build a £360 million (£416 million) new carbon capture (CCS) plant at the Stanlow refinery in Merseyside, UK. This is in line with its ambition to

become a leading low carbon refinery by 2030.

Essar is investing over £1 billion (€1.1 billion) into a range of energy efficiency, fuel-switching, and carbon capture initiatives, designed to decarbonise its production processes significantly by 2030 and put Essar at the forefront of the UK's shift to low carbon energy.

Deepak Maheshwari, CEO of Essar Oil UK says: 'This new carbon capture plant is the single biggest initiative to decarbonise our processes and a core element to our hugely ambitious decarbonisation strategy. Our ambition is to become a leading low carbon refinery. This is a massive undertaking, but it is a journey we are fully committed to. Not only is it the right environmental thing to do, it will future proof the critical Stanlow refinery for the long term, protecting jobs and industry, while also placing Stanlow at the very centre of the UK's energy transition.'

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Meeting the Challenges

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- Managing contractor competency
- Recent major industry incidents
- Remote Inspection Technologies

Mastering the Changes

- Post-Covid effects on working practices & culture in organisations
- Repurposing infrastructure & pipelines for future fuels
- Integrity management in a changing climate
- Uninterruptible Power Supplies
- Centrifugal pump integrity
- Corporate Memory

Exploiting Opportunities

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Europe

LINDE AND SLB COLLABORATE FOR CCS

Multinational chemical company, Linde, and global technology company, SLB, are collaborating on carbon capture, utilisation and sequestration (CCUS) projects to accelerate decarbonisation across the industrial and energy sectors.

'CCUS is vital in creating the decarbonised energy systems our planet needs to balance energy demand with climate objectives,' says Olivier Le Peuch, CEO of SLB. 'We are excited about this collaboration with Linde to develop CCUS projects and support the growth of low-carbon energy products from conventional energy sources.'

'Carbon capture and storage will be a key lever for tackling global warming,' adds Sanjiv Lamba, CEO of Linde. 'We are committed to helping customers decarbonise their operations.'

Germany 

QATARENERGY SIGNS FOR LNG WITH CONOCOPHILLIPS

State-owned petroleum company, QatarEnergy has announced the signing of two long-term LNG sale and purchase agreements (SPAs) with hydrocarbon corporation, ConocoPhillips.

This SPA regards the delivery of up to 2 million tons per annum (MTPA) (1.8 million tonnes per annum) of LNG from Qatar to Germany.

The LNG volumes will be sourced from the two joint ventures between QatarEnergy and ConocoPhillips that hold interests in Qatar's North Field East (NFE) and North Field South (NFS) projects.

Saad Sherida Al-Kaabi, the minister of state for energy affairs and CEO of QatarEnergy says: 'We are pleased to sign these agreements with our partner ConocoPhillips to supply up to 2 MTPA of LNG to Germany from the two QatarEnergy-ConocoPhillips joint ventures in the NFE and NFS LNG expansion projects, starting in 2026.'

North Sea, UK 

KENT SECURES THREE-YEAR CONTRACT WITH INEOS

International integrated energy services partner Kent has been awarded a three-year contract to provide structural integrity analysis modelling services for global chemical producer INEOS UK on its southern North Sea (SNS) offshore platforms, Breagh Alpha and Clipper South.

Kent will support the safe and sustainable structural integrity management of existing offshore facilities for INEOS UK. The contract covers the full suite of structural analysis services including global strength, fatigue and detailed local analyses. Kent's experts will apply their technical approach to assess the environmental hazards and implement practical measures to manage these.

Philip Walker, chief engineer and team lead for offshore structures, O&G and offshore wind at Kent, says: 'We look forward to supporting INEOS UK SNS.'

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Bulgaria



OILTANKING ANNOUNCES SALE OF BULGARIA TERMINAL

Logistics service provider for tank terminals, Oiltanking, has announced an agreement to sell its 91.1% stake in the liquid storage terminal in Varna to the Astra Group.

The terminal with a storage capacity of 25,860 m³ is located at the Black Sea in Devnya, Varna and provides storage and handling services for inorganic chemicals, biofuels and edible oils. The remaining shares of the Bulgaria terminal are held by the Port of Varna and are excluded from the transaction, due to complete in 2023.

Matti Lievonen, CEO of Oiltanking says: 'We sincerely thank our customers for their trust and the local team for their loyalty, dedication and hard work over the past two decades. This terminal continues to have great potential, which we are confident the Astra Group is the right party to exploit.'

UK



SIEMENS ENERGY BEGINS WORK ON AMMONIA CRACKER

Siemens Energy has started work in Newcastle, UK, on a new £3.5 million (€4 million) ammonia cracker prototype designed to produce green hydrogen at an industrial scale and help tackle climate change by reducing carbon emissions.

The project is in development with global resources leader, Fortescue Industries and renewable energy company, Geopura.

The ammonia cracker system will provide the potential to produce green hydrogen at scale, wherever and whenever it is needed. The system will be designed to deliver high-purity hydrogen, suitable for PEM fuel cell use, using FFI's Metal Membrane Technology (MMT) purification process.

Steve Scrimshaw, VP at Siemens Energy UK & Ireland and a member of the UK government's hydrogen advisory council says: 'We have just 13 years to deliver a net-zero electricity grid for the UK. Time is running out and we can't do this alone. This innovative green ammonia cracker could be a game-changer for scaling up the green hydrogen industry – an important step to drive the energy transition.'

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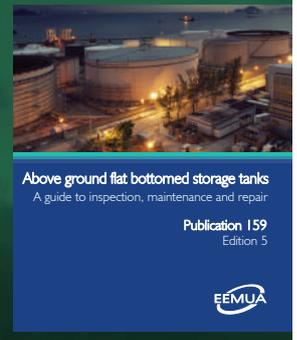
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PORT OF ROTTERDAM LEADS AMMONIA CRACKER STUDY

An initiative of 18 companies including Air Liquide, Aramco, BP, Essent/E.ON ExxonMobil, Gasunie, GES, HES international, Koole Terminals, Linde, OCI, RWE, Shell, Sasol, Uniper, Vopak, VTTI and led by the Port of Rotterdam Authority, has kicked off a study into the possibility of a large-scale ammonia cracker to enable hydrogen imports.

Participants have commissioned Fluor to study possibilities for a large central cracking facility in the port area to convert imported ammonia back into hydrogen. This is expected to be used in the port or transported via pipelines to facilitate the decarbonisation of other industrial clusters in north west Europe.

The pre-feasibility study will investigate the technical, economic, environmental and safety requirements of a large cracking facility with results due in 2023.

Allard Castelein, CEO of the Port of Rotterdam Authority, says: 'Europe will need large amounts of hydrogen to reach its climate objectives and a significant share of this can be imported via the port of Rotterdam. Ammonia is one of the most efficient ways to transport hydrogen and by establishing one central ammonia cracker, we can save time, space and resources to enable the imports of a million tons of hydrogen per year.'

Norway



SWITZERLAND AND NORWAY SIGN CARBON CAPTURE DEAL

Norway and Switzerland have signed a deal to further explore carbon capture and storage (CCUS) and carbon dioxide removal (CDR).

The agreed cooperation follows a meeting between the Norwegian minister of petroleum and energy, Terje Aasland, and the Swiss minister of the environment, transport, energy and communications, Simonetta Sommaruga.

Norway's vast carbon capture potential will be helpful to get Switzerland to reach net-zero by 2050.

Greece



LNG FLOATING STORAGE IN REVITHOUSSA RECEIVES CARGO

Mytilineos, a global industrial and energy company, has unloaded the first LNG cargo from DESFA's floating natural gas storage unit (FSU) in Revithoussa, Greece.

The transshipment of over 140,000m³ LNG cargo is being unloaded via a ship-to-ship process – the first time this procedure is being carried out in Greek territorial waters.

The FSU is moored 700m from the LNG terminal, increasing Revithoussa's storage capacity from 225,000m³ to approximately 370,000m³ LNG in total. It offers the LNG facility additional flexibility when receiving and unloading LNG cargoes, as it is now possible to unload two LNG carriers simultaneously.

Finland



AVENIR COMPLETES FIRST LNG DELIVERY TO NEW FINLAND TERMINAL

Avenir has completed its first LNG delivery into the newly commissioned Hamina LNG terminal in Finland. The LNG cargo was loaded by Avenir Supply & Trading on board the Avenir Aspiration vessel from the Murgardos terminal in Spain. Her sister ship, Avenir Ascension, is currently enroute towards Hamina for the second LNG unloading in a few days' time.

The delivery into Finland further advances our strategy of becoming a leading supplier of LNG across Northern Europe. This follows Avenir's recently announced LNG/bioLNG terminal in Oxelösund, Sweden, bunkering agreement with Destination Gotland in Sweden and supply agreement into the small-scale LNG terminal in Klaipeda, Lithuania.



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TERMINAL NEWS: THE AMERICAS

Pennsylvania, US 

NIKOLA AND KEYSTATE TO CREATE LOW-CARBON VALUE CHAIN

Nikola Corporation and KeyState Natural Gas Synthesis are working together to create Pennsylvania's, US, first low-carbon hydrogen production value chain. The project is set to include full integration of commercial carbon capture and storage.

The project is set to show the transition to lower emissions in transportation, chemicals, and manufacturing. Operations are due to commence in 2026. With over 7,000 acres, the KeyState site is expected to have the capacity to store the carbon associated with the hydrogen production. In addition, the project will provide strategic reach and access to premium mid-Atlantic FCEV (fuel cell electric vehicle) markets.



KeyState will also produce ammonia and urea for the industrial and transportation markets.

Texas, US 

SEMPRA AND CONOCOPHILLIPS SIGN 20-YEAR SPA

Energy infrastructure company, Sempra has announced that its subsidiary, Sempra Infrastructure, and multinational hydrocarbon corporation, ConocoPhillips have implemented a 20-year sale and purchase agreement (SPA) for 5 million tonnes per annum (mtpa) of liquefied natural gas (LNG).

The LNG will be from Phase 1 of the proposed Port Arthur LNG project under current development in Jefferson County, Texas, USA.

Phase 1 of the project is expected to include two natural gas liquefaction trains and LNG storage tanks, and associated facilities capable of producing, under optimal conditions, up to approximately 13.5 mtpa of LNG.

The parties have also entered into an equity sale and purchase agreement in which ConocoPhillips will acquire 30% of the equity in Phase 1 of Port Arthur LNG, and a natural gas supply management agreement.

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Georgia, US



SAVANNAH PORT TERMINAL TO GET \$410M UPGRADE

The port of Savannah is planning a \$410 million (€389 million) development of one of its terminals in the USA to make room for the loading and unloading of larger ships.

The Georgia Ports Authority's governing board approved the project, under a plan to develop and expand Savannah's capacity for cargo containers, to more than 50% by 2025.

Ocean Terminal will be converted to handling cargo in containers as part of the development. The terminal's berth will also be upgraded with room to service two large ships simultaneously. The port authority's plan to add capacity for an additional 3 million container units by 2025 will allow Savannah to be able to better deal with the next arrival of multiple cargoes at one time. The expansion will be built in phases, with the first phase expected to open in 2025. The second is expected to open in 2026.

US



US DOE ANNOUNCES \$1.5 MILLION TO TRAIN NEXT HYDROGEN WORKFORCE

The US Department of Energy (DOE) has announced \$1.5 million (€1.44 million) in funding for five projects that will aim to advance key clean-hydrogen technologies, while growing the skills and knowledge of science and engineering students at Minority Serving Institutions.

The funding will be provided by the DOE Hydrogen and Fuel Cell Technologies Office (HFTO) through an amendment to a funding opportunity from the Office of Fossil Energy and Carbon Management (FECM).

The new projects will aid the tank storage industry to gain new and younger talent as well as increased awareness of the multiple roles in the tank storage sector. As a wider impact, the funding will improve insights and education on hydrogen, its production and storage, leading to better solutions and technologies in the future.

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TERMINAL NEWS: AFRICA & MIDDLE EAST

Mozambique



BP SHIPS LNG FROM MOZAMBIQUE'S FIRST PROJECT OF ITS KIND

BP has successfully loaded the first cargo from Mozambique's offshore Coral Sul FLNG facility. It is the country's first LNG project and first floating LNG carrier in deep waters.

Under a long-term contract, BP will purchase 100% of LNG output from Coral Sul FLNG, which has the capacity to produce up to 3.4 million tonnes of LNG per year.

BP aims to expand its LNG portfolio to 30 million tonnes by 2030.

Carol Howle, EVP trading and shipping at BP, says: 'The start of production from the Coral Sul FLNG facility represents a major milestone for Mozambique, the project partners, and BP as the LNG buyer. As the world seeks secure, affordable and lower-carbon energy, global demand for LNG is expected to continue to grow. This new supply source further enhances BP's capability to deliver LNG to markets across the world and we look forward to continuing our close collaboration with all those involved in the project.'

Oman



EXOLUM SELLS STAKE IN OQL TO OQ

Exolum and OQ, the largest energy company in Oman, have agreed on the sale of Exolum's 40% stake in their joint venture OQL. OQL is the leading fuel logistics company in the country, with a market share of 70%.

Exolum and Oman collaborated in 2014 for the design, construction and operation of the Muscat Sohar Pipeline Project and the Al Jifnain terminal in Oman (MSPP). Both companies concluded that the best option for all parties was the divestment by Exolum of its stake, so OQ is now the owner of 100% of shares in OQL.

The company's acquisition price was determined through a pre-agreed mechanism in the shareholders' agreement.

UAE



ENOC AND IHI SIGN MOU FOR CARBON

Dubai's international oil and gas company, ENOC Group, and Japanese heavy-industry manufacturer, IHI Corporation, have signed a memorandum of understanding (MoU) to explore a low-carbon hydrogen and low-carbon ammonia supply chain in the UAE.

As part of the agreement, both parties will complete corresponding studies for green ammonia production in the UAE. This will include a pre-feasibility and feasibility study for the pre-FEED (front end engineering design) and FEED studies for the demonstration plant, and pre-FEED and FEED for the full-scale production plant.

This partnership aligns with Dubai's clean energy strategy 2050 and the UAE energy strategy 2050 to meet the country's economic requirements and environmental goals.

UAE



VTTI ACQUIRES IPTF TERMINAL

Energy storage provider VTTI has announced the acquisition of the IL&FS Prime Terminals FZC (IPTF) energy storage terminal in Fujairah, UAE.

The acquisition means that VTTI now owns 90% of the terminal, while the

other 10% will remain with the Fujairah government.

The 333,484 m³ terminal allows VTTI to expand its position in the Port of Fujairah.

Mauritania



BP AND MAURITANIA SIGN MOU

Multinational oil and gas company, BP, has signed a memorandum of understanding (MoU) with the government of Mauritania to deliver an innovative programme exploring the potential for large-scale production of green hydrogen.

BP will carry out a number of studies to evaluate the technical and commercial feasibility of producing green hydrogen in Mauritania.

Anja-Isabel Dotzenrath, BP's executive vice president of gas and low carbon energy says: 'We are already developing one of the world's most innovative gas projects with the support of the Mauritanian government. And we now intend to expand our partnership into low carbon energy by exploring the potential for a world-leading green hydrogen development, which could position Mauritania at the forefront of the energy transition.'

BP will initially carry out a data collection campaign with studies assessing the suitability of wind and solar resources in selected locations for large-scale renewable power generation and green hydrogen production.



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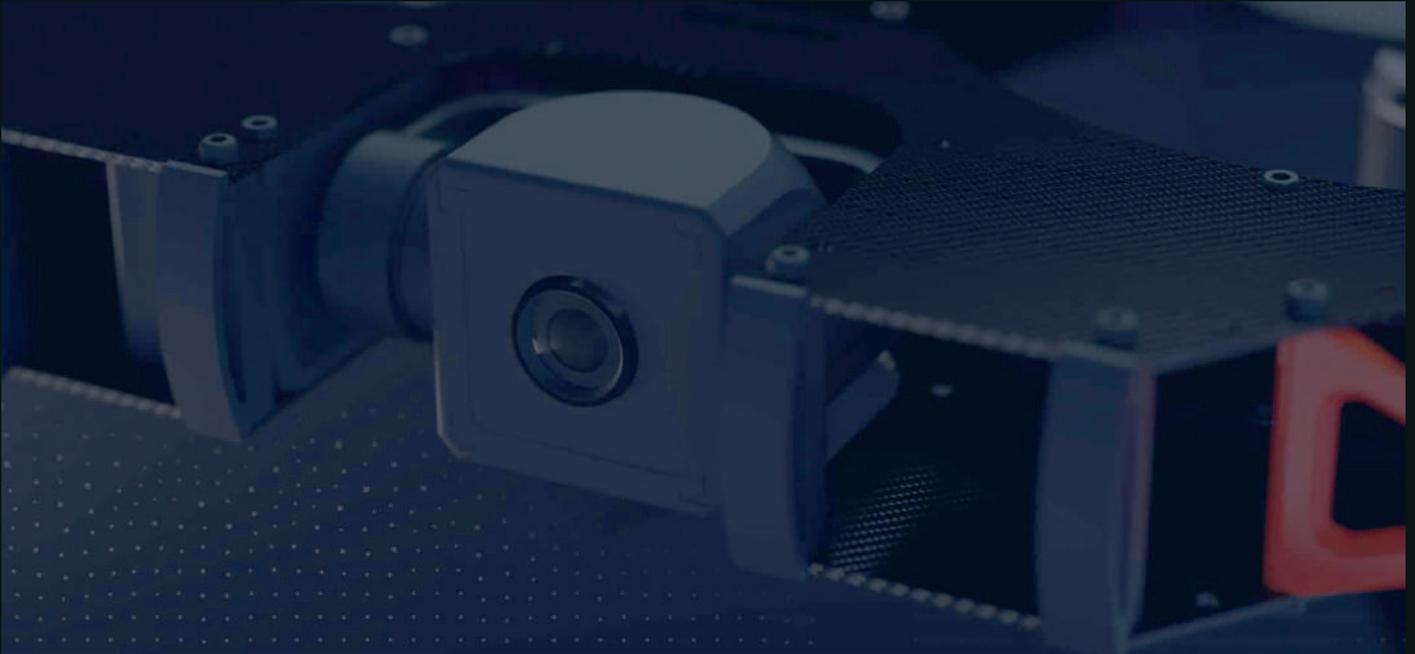
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TERMINAL NEWS: ASIA



China



INEOS AND SINOPEC SIGN JOINT VENTURE FOR NEW PETROCHEMICALS COMPLEX IN CHINA

Ineos and Sinopec have announced a new joint venture agreement that will see Ineos acquire a 50% share in the existing Tianjin Nangang Ethylene Project from Sinopec. The project is currently building a 1.2 million tonne ethane cracker, expected to come on stream at the end of 2023, and downstream derivative plants in Tianjin, China.

A full suite of derivative units will be built at the complex, including the 300ktpa ABS (acrylonitrile butadiene styrene) plant in the 500ktpa HDPE (high-density polyethylene) plant announced by Ineos and Sinopec in July.

The joint venture agreement was signed during a virtual meeting.

India



ACME SIGNS MOU WITH KARNATAKA FOR GREEN HYDROGEN

Renewable energy company, ACME and the government of Karnataka, India, have signed a memorandum of understanding (MOU) to invest about Rs 52,000 crore (€6.35 million) to set up a green hydrogen and green ammonia project.

The MoU was signed by Sandeep Kashyap, COO at ACME and E V Ramana Reddy, additional chief secretary to the

government, commerce and industries department.

ACME will set up a 1.2 MTPA (million tons per annum) green hydrogen and green ammonia plant associated with captive solar power unit. The project is planned between 2022 and 2027.

Shri Manoj Kr Upadhyay, founder & chairman of ACME says: 'We are delighted to partner with the state of Karnataka in developing one of the largest and earliest green ammonia projects in the world.'

Japan



IDEMITSU TO INVEST ¥690 BILLION IN ENERGY TRANSITION

One of Japan's most prominent oil refineries, Idemitsu Kosan Co, has announced it will invest ¥690 billion (€4.3 billion) over the next three years to March 2026 to step up its energy transition procedures, while scaling down fossil fuel assets, to tackle climate change.

Idemitsu aims to lower the proportion of its total profits coming from fossil fuel businesses to 70% – compared to 95% currently. To boost profits from non-fossil fuel segments, Idemitsu plans to spend ¥290 billion on cleaner fuels such as sustainable aviation fuel (SAF) and ammonia.

¥130 billion will be spent to reinforce Idemitsu's mainstay in businesses such as petroleum, functional materials and resources, while ¥270 billion will be used for operational maintenance.

To manage the estimated 20% fall in domestic fuel demand by 2030, Idemitsu plans to reduce its refinery capacity by 300,000 barrels per day.

South Korea



ARAMCO TO MAKE ITS BIGGEST INVESTMENT IN SOUTH KOREA

Petroleum and natural gas company, Aramco, is making its biggest ever investment in South Korea to develop one of the world's largest refinery-integrated petrochemical steam crackers through its S-OIL affiliate. This is in line with the company's strategy to maximise the crude to chemical value chain.

The \$7 billion (€6.7 billion) Shaheen project aims to convert crude oil into petrochemical feedstock and would represent the first commercialisation of Aramco and Lummus Technology's TC2C thermal crude to chemicals technology.

Located at S-Oil's existing site in Ulsan, South Korea, the new plant is planned to have the capacity to produce up to 3.2 million tons (2.9 million tonnes) of petrochemicals annually and include a facility to produce high-value polymers. The steam cracker is expected to process by-products from crude processing, including naphtha and off-gas, to produce ethylene.

The project is expected to start in 2023 and be completed by 2026.

China



PETROCHINA ACCEPTS LNG TANKER

PetroChina International, a Chinese oil and gas company, has taken the first of three liquefied natural gas (LNG) tankers from China's Hudong-Zhonghua Shipbuilding Group.

It is one of three that were ordered in 2020 as part of the joint venture between PetroChina International, Shanghai LNG and Cosco Shipping Energy Transport Co.

The vessel has capacity for 174,000 m³ of LNG and cost \$600 million (€597 million).

'Under the complex global environment, owning your own shipping capacity has become increasingly important,' says Wu Junli, president of PetroChina International.

INCIDENT REPORT

A summary of the recent explosions, fires and leaks in the tank storage industry



11 November 2022



USA

On Monday 7 November, Symrise chemical plant in Georgia, USA, caught fire and suffered a series of explosions. Local law enforcement is working with the chemical plant to determine the cause of the fire.

The fire was caused by hydrogen peroxide pinene which is manufactured at the site.

The ongoing investigation will see specialist crews finalising the monitoring of tanks, shutdown of valves and extinguishing spot fires on the site. They will then coat the area with a foam blanket to suppress fumes.

21 November 2022



YEMEN

A drone-fired rocket hit Yemen's al-Dhabba offshore oil terminal, in Hadhramaut province on November 21, according to the Yemeni government.

The Houthis fired a projectile from a drone that landed at the entrance of the terminal. The vessel had originally entered the terminal to load a shipment of crude oil, but left after the attack. All crew and vessel have been reported safe.

18 October 2022



UKRAINE

Russian suicide drones have hit storage tanks containing sunflower oil at a terminal in the Ukrainian port city of Mykolaiv.

Mykolaiv is one of the biggest ports in Ukraine. Shipments were halted at the start of the Russian invasion, but Ukraine has been pushing to reopen the port to expand shipments of food under a deal brokered by the UN and Turkey.

This attack is part of a series of attacks to happen.

23 October 2022



THE NETHERLANDS

During maintenance work on the Moerdijk industrial estate in Noord-Brabant, the Netherlands, eight people were hospitalised after contact with a poisonous chemical. One is reported to have severe injuries.

The incident was first reported on Wednesday 23 November at 8.51am. Emergency services were called to the scene immediately.

The safety board has said it has not yet established whether the chemical should have been in the tank or how the leak occurred.

13 December 2022



USA

Efforts to clean a spill of 588,000 gallons of oil from the Keystone Pipeline into a creek in Washington County, USA, remain ongoing.

The incident is the largest in recorded history, accumulating in more oil lost than all the crude oil pipeline spills in 2021 combined.

The spill is the largest recorded in history and officials are now attempting to clean the mess caused by the spill which spans over 2,600 miles from Canada to the US. The dedicated workforce exceeds 250 personnel, including environmental specialists.



TANK TERMINAL UPDATE

Pernambuco



ONCORP

Products: Regasification terminal

Cost: R220 million (€43.2 million)

Construction/expansion/acquisition: Brazilian holdings, energy service and production company, Oncorp, has been selected to build a regasification terminal at Suape port in Pernambuco. This will be used by Shell to supply imported natural gases to state-controlled distributor Copergas.

Comment: Once complete the terminal will have the capacity to import 4 million to 9 million m³ of natural gas per day.

Louisiana, US



PLUG POWER

Products: Hydrogen plant

Capacity: 150,000 MTPA

Construction/expansion/acquisition: The new plant extends Plug's national hydrogen facilities network. The company aims to produce 500 tonnes per day of liquid green hydrogen by 2025, increasing to 1,000 tonnes per day by 2028.

Comment: The construction of the facility will see 160 jobs available in 2022, and 215 in 2023.

India



GAIL

Products: Purified terephthalic acid

Cost: Rs20 billion (€240 million)

Construction/expansion/acquisition: JBF Petrochemical, a subsidiary of JBF Industries, was originally set up in September 2008 to produce 1.25 million tonnes per annum of purified terephthalic acid (PTA). However, in 2017, JBF was forced to stop operations due to the company failing on its loans.

Comment: JBF was forced to stop operations due to the company failing on its loans.

Piombino, Italy



SRG.MI

Products: LNG terminal

Construction/expansion/acquisition: A state-appointed commissioner formally approved the setting up of a new liquified natural gas (LNG) terminal in the Italian port of Piombino. Preparatory works will be undertaken by SRG.MI and the floating storage and regasification unit (FSRU) will be part of a broader plan.

Comment: Rome announced that the terminal needs to be operational by March 2023.

North Sea, UK



CENTRICA

Products: Gas storage

Capacity: 30 billion cubic feet (849 million m³)

Construction/expansion/acquisition: Centrica has announced that the Rough gas storage facility, located in the North Sea, will reopen, having undergone significant engineering upgrades over the summer and commissioning over autumn.

Comment: This will be the first gas injection into the site in over five years and will establish Rough's ability to store up to 30 billion cubic feet (849 million m³) of gas for UK homes and businesses over winter.

Antwerp, The Netherlands



VESTA TERMINALS

Products: Multi-purpose tanks

Capacity: Five 30,000m³ tanks

Construction/expansion/acquisition: Vesta Terminals' MAIA project at Vesta Terminals Antwerp (VTA) is changing hands. Following the launch of the project's launch in March 2021, Vesta Terminals handed over the project to VTA operations. In total, five multi-purpose tanks of 30,000m³ each were built and connected to the CEPS pipeline.

Comment: The project is also celebrating zero injuries, whilst completing on time, within budget, and fully contracted.

Brazil



CATTALINI PIER

Products: Liquid storage terminal

Capacity: Expansion from 12.5m to 12.8m

Construction/expansion/acquisition: Cattalini Terminals Marítimos, a liquid storage terminal in Brazil, has extended the draught of the outer cradle of its private pier from 12.5m to 12.8m. The change was evaluated by the Captaincy of Ports of Paraná (CPPR), the Ports of Paraná and Praticagem.

Comment: The outer cradle of Cattalini's private pier has the operational capacity to receive ships with up to 70,000 deadweight tonnage (DWT) and 229m in length overall.

Georgia, US



COLONIAL TERMINALS

Products: Liquid terminals

Capacity: Two million barrels

Construction/expansion/acquisition: Liquid and dry bulk storage terminal, Colonial Terminals, has acquired two liquid terminals owned and operated by bulk liquid storage terminal operator, International-Matex Tank Terminals (IMTT).

Comment: The acquisition increases Colonial Terminals storage infrastructure to more than 6.5 million barrels.

East Yorkshire, UK



EQUINOR

Products: Low-carbon hydrogen

Construction/expansion/acquisition: Centrica and Equinor have signed a cooperation agreement to explore the potential for developing a low-carbon hydrogen production hub at Easington in East Yorkshire, UK. The development further strengthens the region's growing status as the UK's foremost hydrogen hub.

Comment: The transition would also safeguard many of the existing jobs within the gas terminal, whilst also creating additional jobs in the future.



ADANI PORTS

Products: Liquid storage

Construction/expansion/acquisition: Adani Ports and Special Economic Zone (APSEZ), the largest transport utility in India, has agreed to the acquisition of Oiltanking India's 49.38% equity stake in Indian Oiltanking (IOT), one of India's largest developer and operator of liquid storage facilities.

Comment: With this acquisition, APSEZ's oil storage capacity jumps 200% to 3.6 Mn KL, making it India's largest third-party liquid storage company.



GERMANY

Products: Liquefied natural gas

Construction/expansion/acquisition: The German government has completed launching its first floating liquefied natural gas (FLNG) terminal. This will receive liquefied natural gas as part of Berlin's plan to replace Russian gas. The infrastructure was completed in 194 days which was achievable due to permitting exceptions and forgoing environmental impact assessments.

Comment: Due to the halt in gas supply from Russia provider Gazprom, following the destruction of the Nord Stream 1 pipeline, Germany would be missing 50 billion m³ of gas yearly.



EXOLUM

Products: Hydrocarbons

Cost: €30 million

Construction/expansion/acquisition: Exolum will invest €30 million in the construction of a plant for hydrocarbon treatment and recovery on a site in Algeciras Bay. In addition, to help develop this project, Exolum's project named Garbium and has reached a collaboration agreement with Naviera Murueta.

Comment: The plant will have the capacity to treat 550,000 tonnes of product per year and is expected to be operational by the start of 2025.



AIR PRODUCTS AND MABANAFT

Products: Green energy

Construction/expansion/acquisition: Air Products and Mabanaft, through a joint development agreement, its subsidiary Oiltanking Deutschland, have announced their intention to build Germany's first large-scale, green energy import terminal in the Port of Hamburg. The joint development agreement aims to develop green ammonia import and distribution infrastructure in the Port of Hamburg.

Comment: The project hopes to provide hydrogen to Germany in 2026, with the planned import terminal to be located at Mabanaft's existing tank terminal port.



INPEX

Products: Ammonia-hydrogen

Construction/expansion/acquisition: Large-scale LNG project company, Inpex, has announced it has taken a final investment decision on drilling operations and the construction of facilities associated with a demonstration clean hydrogen-ammonia project in Kashiwazaki City, Japan.

Comment: The project is expected to involve the transportation of natural gas produced at the Inpex-operated gas field in Niigata Prefecture to the Hirai area using an existing pipeline.



VTTI

Products: Energy storage

Construction/expansion/acquisition: Energy storage provider VTTI has announced the acquisition of the IPTF (IL&FS Prime Terminals FZC) energy storage terminal. The acquisition means that VTTI now owns 90% of the terminal, while the other 10% will remain with the Fujairah government.

Comment: The 333,484 m³ terminal allows VTTI to expand its position in the Port of Fujairah.



ACWA POWER

Products: Battery storage

Construction/expansion/acquisition: ACWA Power, a leading Saudi developer, signed a memorandum of understanding with PT Perusahaan Listrik Negara (PLN), Indonesia's state-owned electricity provider. The agreement looks to develop battery storage from renewable energy facilities and green hydrogen development in the country expanding their portfolio.

Comment: The agreement lays out a clear pipeline of renewable energy and technological development for ACWA Power in the country.



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THE STORAGE OUTLOOK

Senior executives from 11 storage terminals reflect on the challenges of 2022 and consider what opportunities the future might hold



Advorio

BAS VERKOOIJEN

CEO, Advorio

2022 was a milestone year for Advorio, launching our new company focused on growth in petrochemicals, gases and new energies, and on taking a frontrunner role in the energy transition.

At the same time, it was a critical year for the industry, largely driven by Russia's invasion in Ukraine; the invasion brutally disrupted the lives of millions of people, while subsequent sanctions have adversely impacted global energy supplies. Energy security has become a top priority for many governments. We have seen increased pressure from inflation and rising prices on utilities, gas, and power. We are starting to see an impact on demand, and therefore production, which may also impact the demand for storage capacity.

Against this backdrop, Advorio has seen a strong operational and financial performance in 2022. We have made good progress with our priorities as we execute on our strategy: accelerating growth, maximising value of our existing assets, and driving sustainability across our business. A good example of this is the completion of one of the biggest LPG storage tanks in Europe at our Antwerp Gas Terminal, Belgium. This new and fully refrigerated tank has a capacity of 135,000m³ and, despite Covid, was delivered on time and within budget.

Throughout all these changes, I am especially proud that we have continued

to serve our customers safely and reliably. We have maintained high service levels and a good HSSE performance across the business. I am most thankful to our customers, employees, and wider stakeholders for their trust and support throughout 2022.

THE NEED FOR PARTNERSHIPS

The energy transition that lies ahead of us is complex and requires close coordination and cooperation along the value chain. No one can do this alone. A successful energy transition will depend on successful partnerships, and that is exactly what our strategy is built on. We want to pursue opportunities and address challenges in partnership with our customers and other stakeholders so that we can build better businesses together. Businesses that are better for the environment, for our customers, for our shareholders and for society.

Advorio has a strong pipeline of growth initiatives in chemicals, gases and new energies that we are developing in close cooperation with our partners. Through the recent partnership with Fluxys in Belgium we will, in line with Europe's hydrogen strategy, jointly explore opportunities for developing a green ammonia import terminal in Antwerp. In Mexico we have partnered with Braskem Idesa for the development of an ethane import terminal, feeding into their world-scale cracker complex. And we have also partnered with Sasol in north Germany to explore the development of an ethylene import facility.

At our integrated facilities in Texas City and Galveston in the USA, we are developing more than 200 acres of land with deep water access, located on the Houston ship channel.

Together with partners we aim to create a low carbon energy hub supporting hydrogen, ammonia and NGL developments to support local industry as well as export flows.

We are also actively exploring new territories and technologies. In Antwerp and Singapore, we have joined consortiums with leading industry players to explore developing e-methanol plants, contributing to the development of future sustainable energy solutions. Another exciting initiative is Advorio Singapore becoming a partner in a pilot project

to accelerate clean energy innovations by leveraging existing storage tank infrastructure on Jurong Island to enable the deployment of Vanadium Redox Flow Batteries for the storage of green electricity.

OUTLOOK FOR 2023

Climate change is more visible than ever before, and we must act now. At the same time, the need for supply security and changing trade flows, especially into Europe, combined with high inflation and the risk of a global recession, pose significant short-term challenges. The challenge is to find a way to deal with these in parallel. As the storage industry, we play a crucial role in this: ensuring the safe and reliable supply of liquid energy, while at the same time developing the infrastructure for low-carbon energies.

For Advorio, this means that we remain focused on executing our strategy: accelerating growth, maximising value and driving sustainability. On the one hand we will be disciplined in terms of cost control and capital allocation and further increase the productivity of our existing assets.

And on the other hand, we will further invest in growth segments like chemicals and gases and continue to play a frontrunner role in the energy transition. We are actively investing in new infrastructure for low-carbon alternatives and reducing the CO₂ footprint of our own operations.

As we continue our journey, we will drive sustainability across the entire organisation and ramp up efforts to achieve net zero operations by 2040. Building on our 50 years of experience, we will closely work with our customers to find tailored solutions to their storage needs and to support them in their energy transition. We do this in true partnership, or as we like to say: partners for progress.

www.advorio.com



Cattalini Terminals

LUCAS CESAR GUZEN

**Commercial manager,
Cattalini Terminals**

Over the last year, the whole world has been trying to resume business-as-normal, as it was before the Covid pandemic. However, the restrictions of the pandemic have forced us to think about the new normal, to seek solutions and logistical alternatives that would make business viable. This spurred us on to assist clients in their search for logistical solutions that would serve their operations across the globe, in a quest to reduce the impact of disruption in the global value chain.

UNPRECEDENTED TIMES

As we came into 2022, we were faced with an unprecedented war that has drastically changed not only prices, but the supply and logistics of commodities worldwide. On top of this, Brazil experienced a dramatic change in its political landscape. As we end the year, Cattalini Terminals can go into 2023 with a sense of accomplishment because, even considering the volatile circumstances, we delivered high quality service and operations for our customers.

Throughout 2022, our challenge was to meet the great demand for products and the changes in various day-to-day operations. The high prices of commodities, which favoured demand, mainly from countries that consume soy and its derivatives, raised export figures and forecasts.

The search for decarbonisation at a global level also put us in front of operations with a high level of engagement, such as the consolidation of Cattalini as a logistical solution for the transport of biodiesel. For example, Cattalini stored and shipped biodiesel to the Netherlands, an operation

that achieved 100% neutralisation of greenhouse gas emissions.

ACHIEVEMENTS OF 2022

Even through these uncertain times, Cattalini remained optimistic in our quest to remain one of the largest private terminals in Latin America. Investing in training and qualification of personnel, we jumped from 516 to 553 employees. We also invested more into technology infrastructure, with a focus on increasing our capacity to receive and dispatch cargo by road and rail. We concluded the work of our expansion in loading the rail modal for more than 9,000m³ per day.

In addition, we successfully increased the operational draft from 12.5m-deep to 12.8m, as well as increasing our docking capacity to dock ships with an LOA of 229m, and deadweight tonnage of 70,000. This has allowed us to operate larger ships with larger volumes.

We launched the second stage of our Cattalini web application, which allows customers to access information about the logistics of their operation in real time. We consolidated ourselves as the export terminal of 75% of the market share of soy oil in Brazil and broke records in maritime movements within the categories of the various products in which we work.

In 2022, we received ISO9001 and ISO14001 certifications as well as certification of the ISPS Code 53/2020. Among these and other achievements, 2022 was an excellent year for Cattalini, because we kept our eyes on the future and focused on developing better logistical efficiency to serve the global market.

TRANSITION TO 2023

Something that requires the attention of Brazilian terminals in particular is the new political landscape. There is uncertainty for 2023 around the new government's objectives regarding energy policies. Whether driven by geopolitics, changes in the market or global demand for raw materials, the liquid bulk industry has always had to adapt to changes. Terminals need to be prepared to adjust to offer the best logistical solution for a given operation. Investment into the sector is one way to improve the quality of services and make everyone a bit more competitive.

www.cattaliniterminals.com.br



Colonial Terminals

RYAN CHANDLER

President, Colonial Terminals

Towards the end of 2022, Colonial Terminals acquired two liquid terminals in Savannah, Georgia, USA. The acquisition increased Colonial Terminals' storage infrastructure to more than 6.5 million barrels and brought an additional three berths, along with approximately 130 acres of Savannah River frontage. This has allowed Colonial to enjoy continued growth, expanding its reach and adding new customers and employees to the fold, even on top of significant organic growth we've also experienced. While this growth has been exciting, high turnover and the training and development required to bring new employees up to speed have been key challenges for us and the industry.

WORKFORCE CHALLENGES

The terminal industry has not been immune from workforce challenges facing the broader economy, and a hidden cost of high turnover is training and development. After all, it typically takes three to five years to develop an operator qualified to handle multifaceted bulk handling operations. Further, while supply chains are gradually normalising, the intermodal network for marine, rail and road has been anything but synchronised over the past year. This has created challenges for terminal operators and our customers because it has required greater planning and nimbleness to navigate unexpected bottlenecks than ever before, all with a workforce that is accustomed to relative consistency. To me, these have combined to be the industry's greatest challenges over the past year, particularly considering Colonial Terminals remained committed to capitalising on growth opportunities. Balancing the needs of day-to-day

operations while also realising growth objectives were top of mind for our leadership team this year.

ENSURING GROWTH IN AN UNCERTAIN PERIOD

We recognise that pursuing growth at the expense of our team members and customers who have supported us since 1934 is self-defeating. So, we've prioritised recruiting and training and development even at the most senior levels of our leadership team, whilst been highly selective about what growth projects get the green light. Our terminal infrastructure across multiple locations is not typically uniform, so processes and procedures tend to be location- and system-specific. Historically, we would onboard a small number of new team members each year, which allowed significant transfer of knowledge to occur organically through exposure to more senior team members and the variety of systems used at a particular facility. Today, we are dramatically changing our approach to training, creating a 90-day road map for new employees at each facility. It's critical that new team members feel comfortable about the on-ramp to terminal operations, particularly when it comes to safety.

HIRING IN 2023

Relatively speaking, it will never be easier to recruit and develop talent for our industry than it is today – and it's already hard today. Terminal operators must remain focused on the front lines and always ask themselves: 'How can I make life simpler and better for our operators?' For us, that means increased investment in quality processes, technology, and career pathing. Terminals don't operate on four-day week schedules or with remote workforces, so creating and sustaining an attractive work environment and culture will be critical. The operators who create the greatest work experience will carry the day. For me, it's just as important to make sure of what will not change. We will remain focused on our front-line employees. The more we invest in our team, the better our customers will be served, the deeper our customer relationships will become.

www.colonialgroupinc.com



Exolum

JORGE LANZA

CEO, Exolum

2022 has presented many challenges and Exolum has had to face the same complex context as the rest of the industry, marked by variables such as the war in Ukraine, the rise in inflation, issues in the supply chain and higher prices of raw materials and energy.

At a more particular level, this year has been intense and we have focused on the complete integration of the new terminals acquired at the end of 2020 by changing and harmonising systems and accelerating our digitalisation.

PRIORITISING THE ENERGY TRANSITION

The energy transition brings both challenges and opportunities for our industry, but the key is to remember that electrification is not the same as decarbonisation. We should bear in mind that sectors such as heavy industry, which is energy intensive, or heavy and long-distance transport, such as ships, aircraft or lorries, cannot currently be electrified.

For years now, we have been totally immersed in diversifying our activities by focusing on the development of new energy vectors, such as biofuels and green hydrogen. For biofuels, we have infrastructures that are fully adapted to their management and we are currently adapting new tanks to extend the range of components and raw materials for their production. An example of this is our facility in Barcelona, Spain.

Moreover, we collaborate with operators in the development of sustainable aviation fuel (SAF). As such, we have launched pioneering initiatives such as the Avikor platform, which enables any passenger, regardless of the airline, to fly sustainably

by choosing to replace conventional kerosene with SAF, thus helping to reduce the CO₂ emissions of their flight by up to 80%. Avikor has attracted the attention of many companies, such as Vueling, which is already offering the service to all its users. Other companies such as Bizum or Cabify have also joined Avikor to decarbonise all their corporate flights.

In the area of green hydrogen, even though the development of a global strategy for this energy is still needed, our focus is to provide our expertise in order to lead the way on the promising path of this energy vector. A clear example is the construction of Green Hydrogenares, the first plant for the production and dispatch of green hydrogen for mobility purposes in the Madrid region, which will be fully operational during the first quarter of 2023. Furthermore, we have created an alliance with Naturgy to promote green hydrogen for sustainable mobility through the Win4H2 project, which aims to develop a network of 50 hydrogen stations distributed across the country.

SUSTAINABLE PRINCIPLES

Throughout its history, the company has maintained a strong commitment to sustainability. Our ambition is to achieve zero net emissions by 2040, with a reduction of 67% on 2018 emissions by 2030. To achieve this, we are continuing our commitment to high efficiency levels in our operations and with self-consumption at our work centres and facilities. We are currently building photovoltaic plants that ensure a 100% sustainable energy supply. Some of them are already fully operational.

We have signed agreements for renewable energy purchase (PPA) with different producers. This represents not only an advancement towards the company's decarbonisation strategy, but also a reduction of uncertainty regarding energy expenditure in times of tension in the market. In addition, we have modernised the lighting system at all storage terminals with high-efficiency LED lights and have replaced some equipment with more efficient devices to increase energy savings.

We are also developing projects to enhance the monitoring and optimisation of transport through our pipeline network by applying new artificial intelligence (AI) algorithms aimed at reducing energy consumption and, therefore, our carbon footprint.

MOVING INTO AVIATION

In the case of the Lima project, the investment will amount to over \$100 million (€94 million) by 2025 and will be carried out in different phases

with the new infrastructure becoming operational gradually. The project entails the construction of a new fuel storage farm and a new hydrant to supply the new airport terminal. The new facility will connect to a future dedicated pipeline located nearby, which will represent an important reduction in road tanker traffic in the vicinity of the airport and surrounding cities.

We have also completed the renovation of the fuel storage terminal at Dublin airport which we carried out together with DAA, the operator of Dublin and Cork airports, representing an investment of €40 million. After this renovation, the new terminal has three new storage tanks and a new hydrant system at the boarding piers of the airport connected to the storage terminal through a twin pipeline.

WHAT'S IN STORE FOR 2023

Even if the war ends soon, issues with fuel supply chains, especially diesel, and high inflation will still be challenges to tackle next year.

There are also two other matters that concern me which are more long term and which we have to continue to work on. Number one is cybersecurity, which is a priority on the agenda for all companies. We must work on prevention to ensure a solid system that protects users and our facilities and assets.

Number two is attracting and retaining talent. We know that our industry is not the most attractive at this moment, but we have to think about ways to attract talent and emphasise the great number of professional opportunities we offer. We have a long future ahead of us by playing a key role in the energy transition. Therefore, it is important to ensure that we have teams that are qualified and have the required skills to achieve that objective.

www.exolum.com



LBC Tank Terminals

DEWIEN JAGMOAN

Commercial and business development director Europe, LBC Tank Terminals

LBC Tank Terminals is a top-tier global independent operator of bulk liquid storage facilities for chemicals, petroleum, and base oils. We own and operate a global network of seven state-of-the-art and flexible storage terminals at strategic locations in the United States and Europe, offering loading and unloading services for various transportation modes such as pipeline, vessel, barge, rail tank car and truck.

Our headquarters are located in the petrochemical heart in the Port of Rotterdam, the Netherlands. Our facilities combined provide approximately 3 million m³ of bulk liquid storage capacity. Located in important deepwater ports such as Houston and Freeport (Texas), Baton Rouge (Louisiana), Rotterdam and Antwerp (Belgium), our terminals are connected to vital chemical process plants via pipeline networks.

As a global service provider, we have certainly felt the effects of global events. The war in Ukraine has a major impact

on tank terminals and logistic service providers in general. While the economic impact of Covid is still felt by many, households and businesses now also feel the impact of rising gas prices, especially in Europe. Production rates are going down and a recession is looming.

In addition, supply chains remain under pressure because of more structural challenges such as a shortage of truck drivers and containers, vessels and vehicles that are delayed and other intermodal issues. All these elements cause a challenging logistics environment, which eventually is felt by all stakeholders of a tank terminal.

OFFERING CONNECTION AND CONTINUITY

Our strategy is being a connected partner for our customers by offering superior service and sustainable storage solutions. We continue to listen to our customers, and by being agile we can easily adapt to serve their changing needs or respond to the dynamic market circumstances. 'We anticipate' is one of our company values and having a flat organisation and open culture allows for quick decision making. As for a recent example, we were able to respond promptly in updating our contingency plan when uncertainties around potential gas supply emerged.

Throughout most of 2022, we have been able to travel again and meet our customers in person. It was fantastic to feel the energy during events such as the European Petrochemical Association (EPCA) meeting and the various European Petrochemical Luncheons (EPLs). Face-to-face meetings truly contribute to good customer relations. Customer centricity is one of the pillars of LBC's corporate strategy, which implies that we understand what our customers value and ensure that our organisation is geared towards continuously achieving that understanding.

PRIORITISING CLIMATE IMPACTS

Climate change impacts everyone, including our industry. We all have the responsibility to reduce the amount of energy we use and to make the switch from hydrocarbon to sustainable energy sources. Furthermore, our industry plays a vital role in providing infrastructure that is required for products related to the energy transition.

As we are an integrated part of our customers' supply chains, we are part of their CO₂ footprint. Being one of the first tank terminals with an EcoVadis Gold status is great but we need to keep improving and set high ambitions. One of these ambitions is to become CO₂ neutral by 2030 on scope 1 and 2 emissions. We



want to ensure that our customers can also reach their net zero targets when they make use of LBC's infrastructure.

It goes without saying that we continue to focus on storing chemicals and products related to the energy transition such as liquid organic hydrogen carriers, ammonia, methanol and renewables.

THE FUTURE OF THE SUPPLY CHAIN

The high energy costs resulting from the Russia-Ukraine conflict impact the utility costs of tank terminals and, with that, the supply chain costs of our customers. We are investing in energy-saving utilities and equipment as well as in operational efficiencies to reduce this effect.

Digitisation also remains an important topic for two main reasons:

- Tank terminals are increasingly linked to their customers' supply chains, implying that the operating systems of both need to be integrated. It's like becoming one large organisation where critical information should be shared and available in real-time. Such technology is similar to what we see in our personal lives when we order items online.
- Globally and in all industries, cybersecurity remains a priority. In the beginning of 2022, two renowned tank terminal operators were affected by cyberattacks, showing that also the tank terminal industry is a target. It is our duty to ensure that our IT systems are safe and continuously protected.

FINDING TALENT IN 2023

As the number of job vacancies recently reached a record high, it remains challenging to find the right talent in today's labour market. As such, it is critical to invest in your workforce to keep people on board. Our people are our greatest assets. Making our company progress on fundamental items such as sustainability can only be successful when the right quality, leadership and commitment is shown within all layers of our company.

'We empower' is also one of our values, meaning that we empower each other to make responsible decisions and to take ownership of our actions. We need the input and participation of all our colleagues in a transparent, respectful and inclusive way. The diversity within our teams is what makes us strong.

www.lbctt.com



Nordic Storage

DAIVA ANGELDORFF

CEO, Nordic Storage

Effective January 2022, I was appointed as the new CEO of Nordic Storage and look forward to facing the upcoming challenges and opportunities with an emphasis on sustainability and the energy transition.

Nordic Storage AB is part of the HG Storage International (HGS) global portfolio of high-calibre gas and liquid petroleum products storage and logistics businesses. With eight terminal operators across five continents, HGS has over 3 million m³ of storage capacity, of which Nordic Storage constitutes a third (1 million m³). This makes Nordic Storage one of the largest bulk liquid storage providers in Scandinavia.

Nordic Storage owns and operates eight terminals, located in both Sweden and Denmark. All of our terminals are strategically located along the Baltic Sea and the Danish straits. This geographical coverage, in combination with terminal capacity, enables us to manage large volumes of product, building bulk for further transshipment, mixing products to satisfy market demand. It also offers strategic storage close to major markets and serves the local downstream markets with storage.

Nordic Storage has extensive experience and knowledge in handling and storing various products including middle distillates, fuel oil, jet fuel and biofuels. Products can be delivered from and to vessels and we also have bunkering operations as well as automatic tank truck loading facilities at multiple sites.

We offer a complete storage solution tailored in cooperation with our customers to meet their specific needs for both short- and longer-term contracts. Our large network and good relations with authorities and other stakeholders enable

us to find the best possible solutions regarding storage locations, facilities, and services. Through trust and reliability, as well as experience and knowledge, we aim to be a proactive storage partner creating added value for our customers.

CHALLENGES DURING 2022

During 2022, the global energy crisis has caused major uncertainty and turmoil, mainly in the markets for natural gas, coal, and electricity. The consequences have been affecting the oil markets as well, with oil stock releases by IEA member countries to avoid even more severe disruptions.

The storage industry has been impacted by this situation, and Nordic Storage is no exception. As the energy crisis may propel the energy transition towards more sustainable fuels, Nordic Storage is adapting our business to meet customers' needs. Nordic Storage and HGS have come a way preparing for the shift from storing more traditional petroleum products towards more sustainable biofuels and feedstocks.

ACHIEVEMENTS FROM THE PAST YEAR

Even though 2022 has posed some challenges, we have continued to provide excellent service to our customers and have improved our operations.

At the 2022 Global Tank Storage Awards, we received bronze for the Individual/ Outstanding Achievement Award.

Another key focus during 2022 has been the implementation of our new and improved operating management system (OMS). Nordic Storage was the first of the HGS assets to start the implementation of OMS and the aim is to achieve a higher level of safety and effectiveness throughout the business. The main advantage of OMS is to ensure the safe, reliable and responsible operations for the storage and distribution of products throughout the company and HGS.

MOVING TOWARDS THE ENERGY TRANSITION

Looking forward, there is no doubt that the energy transition will have a significant impact on the storage industry. Nordic Storage has extensive experience in the handling and storage of biofuels – as well as middle distillates, fuel oil, jet fuel – and we have the relevant infrastructure required. As a storage group, some of our terminals around the world can receive and store a range of biofuels today. With new biofuels and various types of feedstocks entering the market, some of our terminals and permits may need adapting to allow

for certain products to be handled and stored. We have a deep understanding of the process and look forward to working together with our customers towards the energy transition. We see a great synergy in being part of the supply chain from the start to offer our expertise in the solutions for handling and storage.

Regarding the future of fuels, the end of the road is still far away. The direction towards change is clear but the pace and end products will be determined as regulators, consumers and producers further embrace and commit to the global energy transition. As a storage expert, our involvement from the start can accelerate the process of adapting capacity for new qualities and feedstocks.

SUSTAINABILITY IN 2023

Going into the new year, we are intensifying our efforts towards more sustainable business areas and looking to develop the company further with a clear sustainability ambition. We are positioning ourselves to offer sustainable and green solutions through all stages, contributing to the ongoing energy transition from fossil-based fuels to a net zero carbon world. We are proud to be pioneering within the storage industry and to have used primarily green electricity for almost 20 years.

SUSTAINABLE STORAGE

Another area we will explore during 2023 is sustainable usage alternatives for our rock caverns. Almost half of Nordic Storage’s capacity is in underground rock caverns. We will be looking at the possibility of hydrogen storage here, considering caverns seem to be a highly suitable option. We are building internal expertise and investigating projects which could utilise our caverns for hydrogen or sustainable biofuels in the future.

www.nordicstorage.se



Odfjell Terminals

JEAN PIERRE BRUNEL

Commercial manager, Terquim, Odfjell Terminals Chile

This year, customers as well as terminals have faced quite an unstable environment. One big challenge has been to customise proposals due to the high levels of congestion we have been facing – leaving less time for a response.

At Terquim, Odfjell Chile, our biggest challenge is the safety of our employees and contractors, as well as maintaining our infrastructure properly. Our goal is to achieve zero accidents and no harm to the environment.

SAFETY AND EFFICIENCY

Our biggest achievement during 2022 is, without a doubt, improving our accidents rate and completing this year with an occupation rate of over 95% at both our terminals (Mejillones and San Antonio).

We have a very solid team that is highly oriented to a safety culture, which is constantly reinforced. Our teams have efficient periodic meetings, where the different deviations from our set objectives are reviewed, looking for the best ways to jointly work on the activities that could be overdue.

We are a growing team and have changed some work dynamics, such as avoiding excessively long meetings and reducing bureaucracy. However, our teams are still working on consolidating their dynamics to achieve their maximum potential.

GOING GREEN AND DIGITAL

We believe that there are two main challenges for the industry in the next few years: efficient use of natural resources, moving forward to decarbonisation with green energies and; innovation and the digital transformation.

The impact of these will, without a doubt, be positive – for both the industry and the planet. Achieving decarbonisation will require terminal operators to rethink their processes and equipment. Along with the digital transformation, this will allow for logistical optimisation.

Terminal operators should work jointly, as an industry, as well as with authorities to facilitate and accelerate these changes.

At our Mejillones terminal we are starting the construction of two sulphuric acid tanks to provide storage for the mining industry in the north of Chile. Our focus and purpose are for said tanks to have the highest safety and efficiency standards for both people and the environment. The industry has always been in the forefront of changes and will always be. Our focus will always be on safety and efficiency.

www.odfjell.com



Oikos Storage

ARUN SRISKANDA

Managing director, Oikos Storage

It’s hard to know where to start with 2022. I think the sector will have been buoyed at the start of this year as product demand continued to grow following several ‘false starts’ and lockdowns during 2021. However with demand outstripping bulk fuel supply, forward curves remained backwardated and, as such, prompt demand for tank storage remained low.

RAPIDLY CHANGING LANDSCAPE

It did feel like demand picked up overnight and, in turn, the frequency of imports we were receiving. This was a big pivot; we needed to adjust our manning levels to safely respond to the change in marine

activity. With the tragic unfolding of events in the Ukraine, we also had to react to the changing profile of imports as the supply chain adjusted to the self-sanctioning of Russian origin products.

In the UK, there were also climate change protests from Just Stop Oil for the sector to contend with. Whilst freedom of speech is a privilege, the protestors put both themselves and the staff at affected terminals at potentially serious safety risks. There are a lot of great initiatives that the tank storage sector is working on to help with the transition to a lower carbon economy. My reflection on this year's protest is that people should not be put in harm's way. Instead, we need to work with the government to create a forum for wider education on the sector to help drive more informed discussions.

Moreover, there is an opportunity for government to bring together people from across the fuel supply industry – from transport firms and energy firms to high fuel users – to better ensure future supply and balance out potential peaks, troughs, and shortages. It is clearer than ever that close coordination will be necessary to shape the low carbon fuel market the UK desires.

DEALING WITH A SLOW-DOWN

We continue to actively encourage business to the terminal, but we are still finding some (and rightly so) decision paralysis from customers with regards to the right infrastructure requirements that supports their needs now, but is futureproof for requirements later on.

This is crucial given the opaqueness of current legislation paving the way to net zero, as well as the lack of joined-up thinking between government departments toward building fuel resilience. There are several aspects of the existing regulatory regime the government could review to accelerate the fuel transition further, not all of which are complex or controversial. Simplification of the complex and burdensome planning system, for example, could allow site upgrades to occur in an appropriate timeframe and not deter business decisions seeking to promote the use of these new fuels.

As the activity profile has changed this year, we have been fortunate enough to recruit new staff. However, that in itself has created another challenge. Post-Covid, there has been a large drop off in experienced operators. This has opened the opportunity to bring new starters into the sector and, whilst introducing fresh perspectives is positive, the lead time to onboarding them is a big commitment to an already stretched workforce. We as a sector must also do more to encourage young and diverse entrants to join us

in the critical service we provide to the economy, while policymakers, too, can support efforts with broader and more flexible apprenticeship and training schemes, as well as with simplified pathways to address seasonal shortages.

TRENDS FOR 2023

We have seen and will continue to see the impact of the sanctioning of Russian products in the fuel supply chain. Import profiles are yet to stabilise, which makes resourcing for customers' changing needs more complicated than we would like. The wider issue of managing ever-increasing costs remains very difficult with utility pricing volatility adding to tricky operating costs. The transition away from bulk liquids and to newer, inherently less proven supply chains will also continue to be a journey of learning, and one that decision-makers must take with the sector.

Sadly, I have no tabloid headlines on changes we are making, more iterative improvements where we can across the board. It just feels good to be busier again, we just hope we can manage our position as best we can with the environment changing around us daily!

The terminal supply chain has done exceedingly well at responding to the drastic change in low demand since the pandemic lockdowns. The sector has done this safely whilst trying to pass on efficiencies where they can which all ultimately affect customers and end users. As the sector waits for policy to progress, foremost with the much-anticipated publication of the Low Carbon Fuels Strategy and further proposals to enhance the use and accessibility of more sustainable fuel options, the sector's commitment to safety must continue to be a zenith whilst providing a platform to allow our customers to innovate and adjust to the energy transition agenda.

www.oikos.co.uk



PetroSeraya

SEE YOONG HWEE

Group head, PetroSeraya

PetroSeraya is a Singapore-based, wholly-owned subsidiary of YTL PowerSeraya. We are the fuel management, oil storage and tank leasing arm of YTL PowerSeraya. Located on Jurong Island, our oil terminal houses six jetty berths and 18 oil storage tanks that make up our oil tank farm assets, each with a capacity of 45,000m³. The facility is supported by over 50km of pipeline to minimise products co-mingling.

TACKLING 2022

2022 was a more hopeful year than 2021 as economies worldwide began recovering from the impact of the Covid pandemic, other than China's economy which is still impeded by their ongoing practice of a strict zero-Covid policy.

But the Russia-Ukraine war impacted the demand and supply of energy across the globe, and the backwardation in the oil market that followed continues to impede supply stability. Besides that, in an attempt to manage inflation, we saw the Federal Reserve System and several central banks raise their interest rates.

In the same way that the Covid lockdowns forced many industries to go digital, this oil disruption pushed us to advance our explorations into more stable and sustainable alternatives. We responded by conducting feasibility studies to evaluate how we can convert our existing storage facilities to accommodate biofuel, green methanol, ammonia and other alternative, greener, marine fuels. This would allow us to continue giving our customers the best support we can as the tank terminal sector evolves to more sustainable fuel.

SUSTAINABILITY & LEADERSHIP

PetroSeraya is a niche operator. In the face of uncertain times, we have always

refocused on what make us leaders in this industry – operational excellence. We reminded ourselves that sustainability goes beyond what we offer; it is also about how we are managing our offerings. To continue being an industry leader, we looked at how we could steward our resources more efficiently and whether our people, processes and technologies are capable of going the distance.

To that end, I was appointed as group head of PetroSeraya to focus on optimising our existing processes – improve turnaround times, create storage flexibility, etc – to meet our customers’ needs. I also led the company in implementing more sustainable practices, such as ensuring green spaces, enforcing fairer labour practices, championing greater health and safety and pushing for digitalisation.

DIGITISING PROCESSES

This year, at the Singapore International Bunkering Conference and Exhibition (SIBCON), Thomas Ting, chief technology officer at the MPA, announced their roadmap to digitise the whole workflow of vessel handling transactions.

In alignment with that vision, we are working on our inventory process and systems to bolster the efficiency of our supply chain and operation by going paperless. This same system will also serve to improve inventory visibility for our operators and customers, and subsequently allow us to consider self-service data-driven processes whereby customers can check jetty availability and schedule berthing in the same way that one might book a cinema ticket.

Digitising our data and cataloguing them in a central digital library would drastically reduce our carbon footprint in terms of the amount of paperwork and time required for a typical transaction to reach completion. Beyond that, the data could also be used for analytics to drive better and quicker decision-making.

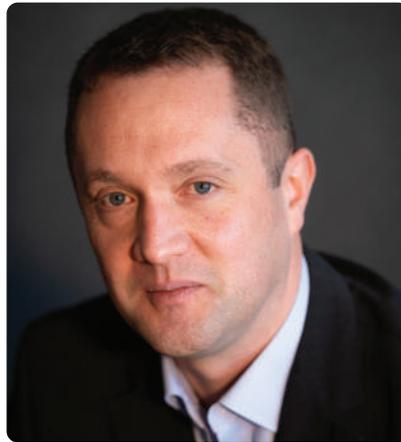
2023 & BEYOND

Our strategic location in Singapore has given us the advantage of a stable government and an industry-friendly regulatory regime. But the global tank terminal sector and its supply chain will continue to evolve, and this evolution is a marathon, not a sprint.

Frequent training remains a priority for everyone at PetroSeraya to ensure that they are always mentally prepared to evolve with the systems we are introducing. I believe our greatest industry challenge will be ensuring the flexibility of our people, processes and technologies. And we will only be able to do that by maintaining with a keen awareness of industry ongoings and inculcating a culture

of constantly innovating solutions that allow us to operate with greater efficiency and effectiveness.

www.petroseraya.com



Stanlow Terminals

SIMON WHITE

Lead engineer, Stanlow Terminals

This is a time of great opportunity for businesses across the energy industry, and terminals are certainly no exception. At Stanlow Terminals, the largest independent bulk-liquid storage facility in the UK, we are focusing on growth in two key areas in the years ahead. We’re increasing our capacity for biofuels storage and diversifying into new types of storage – including chemicals and future fuels – to support the net-zero transition. We’re pivoting a million m³ of capacity over the next three years, of which 300,000 m³ is earmarked for our growing biofuels hub – a key stepping-stone in supporting the decarbonisation of petrol, diesel and in making jet fuel more sustainable.

On top of that, we’re in the process of designing and building new facilities on site to ensure the range of storage solutions we’re able to provide suits the future needs of the market.

Our focus is on meeting the storage needs of the industry in our region, with a great deal focused on the net-zero transition requirements we’re anticipating in the coming years ahead.

FUELLING THE FUTURE

It’s clear that storage infrastructure will play a key role in allowing the UK to achieve net zero. Our projects pipeline includes plans for hydrogen, ammonia – one of

the most promising ways of transporting hydrogen – CO₂, and e-fuels.

Stanlow Terminals is at the heart of the UK’s hydrogen adoption plans. We’ll be playing a key infrastructure role on site in the HyNet hydrogen and carbon capture projects that aim to cut carbon emissions across the northwest by a quarter. That starts in the mid-2020s.

Initially, blue hydrogen produced from natural gas will be transported from Stanlow Terminals by road, rail and pipeline to industrial businesses around the region. As well as handling the storage and distribution of the hydrogen, we’ll also receive and transport the CO₂ that will be sequestered for long-term storage in the depleted hydrocarbon reservoirs beneath the bay of Liverpool.

We’re also anticipating that hydrogen will be a key mechanism for transporting renewable energy from parts of the world where it can be produced in abundance to the places where energy is most needed – and ammonia is likely to be an important storage and transport medium.

We’re currently working in partnership with our green ammonia project in India to provide an open-access import facility that will provide the opportunity to re-gasify or distribute ammonia within the UK.

E-FUELS

Another important transitional stage on the journey towards net zero is likely to be e-fuels. These are synthetic fuels that can be used as direct drop-in replacements for existing petrol and diesel vehicles. They have the advantage of not requiring vehicle owners to invest in new cars or trucks while reducing life cycle emissions.

And looking further ahead, we’re exploring the potential to use some of the tank space here in the UK for flow battery energy storage. Essentially, this is where chemical energy is provided by two chemical components dissolved in liquids as a way of storing power during times when electricity generation across the grid outstrips consumption, so it can be deployed as needed when capacity is stretched. This is something we’re already seeing other European terminals doing as the increase in renewable energy makes balancing the power grid a bigger concern.

MARKET CHALLENGES

We have seen big changes in the way international logistics are being managed throughout 2022. The key long-term impact of this on our business is that our customers are likely to be receiving crude oil and diesel cargoes in larger parcel sizes, coming from further afield than historic norms. This means bigger vessels, and it has led us to put a greater focus on our

deepwater port availability and reliability. Fortunately, that dovetails with our existing plans to make more storage available for imported fuels and chemicals.

The other major challenge we're facing is a serious skills gap in engineering, something that has been developing for many years as previous generations retire and has been accelerated by the Covid pandemic.

In order to make all of our growth plans possible, we have a large number of projects that are either live or imminent, and recruiting the teams we need to support these is one of our biggest challenges.

We're currently looking to recruit around 20 more engineers across the business and we're extending our search for skilled people far and wide not just in the UK but globally in order to secure the skills.

We're entering a critical period of change for energy distribution in the UK and globally, and we're committed to working hard to ensure we're making sure the infrastructure is in place to make possible the transition to a more sustainable future.

www.stanlowterminals.co.uk
www.essaroil.co.uk



environment, difficulties of supply chain and changes in production/import/export flows related to energy prices. While these challenges are not entirely new to the sector, they are normally felt in isolation. But over the course of 2022, we have seen these issues at a concentration and intensity that's unprecedented – all while they happen at the same time.

THE IMPACT OF WAR IN UKRAINE

On top of this, in 2022 the world was faced with Russia's war on Ukraine. It's no secret that this has had – and will continue to have – a paramount impact on our business. From different product flows to keeping pace with changing legislation and sanctions, we have had to adapt quickly and be flexible to accommodate our customers.

Fortunately for Tepsa-Rubis, flexibility is in our DNA. We quickly set up a specific monitoring group within the business to analyse the changes that were happening and liaise with stakeholders, for example. We needed to ensure that not only was our legal department up to speed with the latest legislative changes, but that our customers also understood what was happening and what changes needed to be made.

But of course, any collateral impact on our business is absolutely minor in comparison to the humanitarian crisis that's still emerging in Ukraine today.

ADAPTING TO AN UNSTABLE MARKET

One thing our customers appreciate in this tumultuous environment is our ability to adapt quickly to changes in the market conditions. With energy prices sky-rocketing, we had to look at implementing energy saving measures in order to reduce consumption.

Many of our clients looked at changing their flows and production. For example, some reduced production, but that

left opportunity to increase imports. This was also impacted by a lack of raw materials being available; so some companies looked to import their final product, rather than trying to produce it themselves. Different flows in the feedstocks meant that we're looking at different ways to adapt our installations and procedures.

As far as the industry in Europe is concerned, there are lots of opportunities to adapt operations. And that will be key to the success of the terminaling business. We need to be able to react quickly and adapt by offering solutions that accommodate the new product flows, dedicated lines and tankage, etc. Collaboration between the tank terminal and the client is key to adapting to the market. We need to be able to anticipate their needs and quickly offer a solution.

We are committed to providing adaptable, reliable and responsible solutions for every customer, foreseeing their needs. And that includes being sustainable – not just focusing on quality and yield (though these are important, too).

A SUSTAINABLE FUTURE

We are focused on being key enabler for the energy transition. We live up to our commitment to creating a more sustainable industry. We are committed to providing flexible, reliable and responsible solutions for our customers, connecting industries to society.

Long term, we're looking at sustainability in every single aspect of our business: planet, people and prosperity. In May 2022, we released our first integrated ESG Report, outlining our commitment to the climate and the energy transition, to our clients and stakeholders, and to the people and communities in areas that we have a presence. It's a holistic way of looking at sustainability and our impact on the future.

One thing is for sure, the tank terminal industry is a very dynamic business to be in. We are constantly changing and adapting our processes to keep up with the market. There will be new challenges every year, and perhaps they will have a different level of intensity and concentration to this year, but the key is to adapt to the situation and overcome those challenges to provide the best service to our clients.

www.tepsa.es
www.rubis.fr



Tepsa-Rubis

NURIA BLASCO

MD, Tepsa-Rubis

ENRIQUE MOZO

Business development director, Rubis Terminal

It's no secret that the tank terminal industry has faced a lot of challenges in the last year. There has been significant instability with regards to the economic

ALLEVIATING CONGESTION IN CÁDIZ

Olivia Energy Group tells *Tank Storage Magazine* about the expansion of its Puerto Real Terminal in Cádiz, Spain

INITIALLY BUILT in 2008, Olivia Energy Group's terminal in Puerto Real, Cádiz, Spain represents a highly strategic location. While it's a local storage company, Olivia Energy Group is focused on global trade, so being situated in one of the five main global shipping lanes is crucial to its business. Being 'glocal' is essential.

INCREASING CAPACITY

Olivia Energy decided to expand the 30,000m³ Puerto Real terminal as the market demand was far outstripping its current capacity. Olivia Energy was experiencing an increased demand for physical trading activities on middle distillates, and all terminals in the region were already committed to long-term contracts. So, it was time to invest in additional capacity.

The expansion was completed in August 2022 and includes eight new tanks for fuels and chemicals, ranging from 250m³ to 9,000m³. The new total storage capacity is at 80,000m³ and the Puerto Real terminal is expected to hold a throughput of around 600,000 tonnes per year. In total, the capacity of Cádiz Port, along with other terminals in the group, has reached 130,000m³.

On top of this, Olivia Energy has incorporated two new berthing terminals, which provide enhanced jetty possibilities and help avoid congestion at the port. The terminal can accommodate vessels ranging from coastal to medium range (MR) or Panamax. The pipeline has also been extended.

As well as increasing storage capacity at the terminal, Olivia Energy fitted in-tank mixers and heaters to offer in-tank blending for high viscosity products.

STANDING OUT AS A SMALL TERMINAL

Operational excellence is the main goal for the Puerto Real terminal. The terminal can offer a bespoke service with maximum availability and flexibility to ensure zero demurrage at the Cádiz Port. This is what helps it stand out against some of the bigger named terminals.

This is particularly important as the market is predicted to continue being volatile, so flexibility and the ability to change products in tanks and determine the best tank sizes and designs etc. is a huge advantage.

Olivia Energy also recognises that the permissions process with different

authorities can be complex and time-consuming to store certain product families – so being able to store as many specialised products as possible is another bonus.

REDUCING CARBON EMISSIONS

Olivia Energy wants the terminal to be positioned as a logistics hub for sustainable products. At the same time, the group is looking to reduce its carbon footprint by incorporating renewable sources of energy. The first step is to implement solar energy into Puerto Real terminal's truck loading gantries and buildings. The team also hopes to use solar technology into tank shells.

In addition, along with Cádiz Port Authority, Olivia Energy Group has started an initiative to reforest all empty gardens at the port, with exotic species as a symbol of global trade.

For more information:

www.oliviaenergygroup.com

01 Olivia Energy Group's Puerto Real terminal



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SERVICE AND CERTIFICATION

Marco Dalmeijer and Pim van den Doel tell *Tank Storage Magazine* how Stolthaven Moerdijk gained two new global certifications

STOLTHAVEN TERMINALS took ownership of Moerdijk Terminal in 2012. Located in a lock-free port between Antwerp, Belgium, and Rotterdam, the Netherlands, Moerdijk Terminal offers all the benefits of the connected area, without the congestion. With efficient rail and road access to the hinterland, it's no wonder the port stands out.

'The strategic location of Moerdijk means we are highly accessible, without the congestion of other nearby ports. And the Stolt Tank Containers (STC) depot on site gives customers easy access to their logistics services for the onward transportation of their products,' says acting general manager, Marco Dalmeijer.

Moerdijk is a very versatile terminal, offering integrated end-to-end solutions, various tank sizes, plus available land for development and expansion to meet customer-specific requirements. 'We are always available to current and new customers to discuss opportunities to support and grow their businesses,' says Dalmeijer.

PRODUCT HANDLING

Stolthaven Moerdijk prides itself on providing world-class storage and distribution services for bulk liquids. Traditionally, the terminal specialises in storing and handling chemicals, including speciality chemicals, isocyanates, solvents and base oils. 'More recently, Moerdijk, like many of our terminals around the world, has moved into the storage of bio-based products and biofuel feedstock,' says Pim van den Doel, commercial and business development manager, EMEA.

Moerdijk has experience in building and operating infrastructure for existing product flows such as petroleum products and chemicals. With new-found expertise in the storage and shipping of bio-based products and biofuels, Moerdijk has the ability to leverage the capabilities of Stolthaven Terminals' global network to benefit their customers. 'We can provide efficient, integrated storage and logistics solutions,' says Dalmeijer.

Stolthaven Moerdijk has 45 tanks; a mixture of stainless steel and carbon (and coated) steel, with a total storage capacity of 48,000m³. The tanks range in size from 340m³ to 2,090m³ and this, asserts van den Doel, is a benefit to customers. 'A lot of terminals in Rotterdam and Antwerp have mainly large tanks, whereas Moerdijk can offer a variety of smaller tank sizes to better accommodate more speciality products.'

The majority of Moerdijk's tanks are equipped with insulation, heating/ electrical tracing, real-time temperature monitoring at different levels in the tanks and real-time inventory level control by radar gauging. The terminal has 23 tanks that have been built for mixing, blending and circulation services. That's on top of 26 tanks equipped for low-flashpoint products that are compliant with the latest PGS 29 Dutch guidelines.

Stolthaven Moerdijk also offers value-added services, including drum filling and blending and warehousing for specialist goods, which are standalone services that



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customers can use independently of the storage facility. 'We have one warehouse for packed goods on our premises and three PGS-15 warehouses for packed goods that need specialist handling, with a total storage capacity of approximately 10,000 pallet places,' explains Dalmeijer.

STANDING OUT

'Our customers are very happy that we are ISCC certified because it's one less audit step they have to take,' says van den Doel. Stolthaven Moerdijk achieved the ISCC (International Sustainability & Carbon Certification) and CAT-3 certification in September, when the company achieved its global EcoVadis silver rating. The CAT-3 certification confirms that Stolthaven Moerdijk safely and sustainably stores and handles products containing animal by-products, such as used cooking oil (UCO), which is a major source of biofuel.

'We see biofuels as a growing and important market and these certifications are required for us to store and handle products that are critical to developing more sustainable supply chains and fuel alternatives,' says van den Doel. 'Just as importantly, these credentials help make our customers' lives easier.' Stolthaven Moerdijk is also ISO-9001 certified, and fully complies with CDI-T, SEVESO III and the Dutch PGS 29 and 15 regulations.

The ISCC is a globally recognised standard in the biofuels and energy industry. Van den Doel explains: 'It applies to companies at all points in the supply chain and demonstrates that the fuel, bio-based feedstocks and renewables we store meet defined sustainability criteria.' The ISCC certification is specific to biofuels and bio-based products and is required for Moerdijk to be part of these supply chains. The audit process ensures that there is full traceability of the products they store and the information regarding those is easily providable.

As a result of the ISCC certification, the Stolthaven Moerdijk team is now working with Stolthaven Terminals' Dagenham facility in the UK to provide one of its customers with storage solutions for UCO in the Netherlands.



As advice for other terminals, eager to gain these certifications, Stolthaven Moerdijk believes that, as an industry, there needs to be a focus on operating at the highest possible safety and environmental standards. This will aid in supporting the transition to more sustainable supply chains and build a sustainable future for the bulk storage industry as a whole.

FUTURE PLANS

Discussing the future, Stolthaven Moerdijk is continuing with the digitalisation of the terminal and the expansion of add-on services, such as the pre-treatment and processing of products to optimise their quality. 'Our relationships with our affiliated companies, Stolt Tankers and STC, mean we can easily develop integrated in-country and global supply chain solutions,' explains Dalmeijer.

The digitalisation and automation of terminals is becoming increasingly important and has been a key part of Stolthaven Terminals' global strategy for a while now. The company's inventory automation programme and intelligent assets strategy are driving digitalisation across the terminal network, allowing for real-time data exchange between



systems and improved efficiency, tracking and analysis for customers.

The company is currently evaluating several projects at terminals with available land to provide pre-treatment of feedstock to ensure the quality is improved before customers ship in bulk to refineries. 'There is a clear trend towards products that support a more sustainable energy mix and more sustainable chemical production,' says Dalmeijer. 'Moerdijk is well-positioned and set up in terms of infrastructure to play an important part in that supply chain, as are all of the terminals in our network.'

For more information:

www.stolt-nielsen.com/our-businesses/stolthaven-terminals/terminal-network/stolthaven-moerdijk/

- 01 Stolthaven Moerdijk storage tanks
- 02 Marco Dalmeijer, acting general manager, Stolthaven Moerdijk
- 03 Pim van den Doel, commercial and business development manager, EMEA
- 04 Stolthaven Moerdijk terminal



04

LOOKING TO THE FUTURE

Personal growth and development is the key to success in the industry, according to LBC Tank Terminals' Karine Huysmans



> LBC TANK TERMINALS' transformation manager, Karine Huysmans, is constantly striving for better – both from herself and from the tank terminals industry. 'At the beginning of my career, I took on various roles as an expert. Gradually, I evolved into management roles and the aim of my current position is to transform the business so it is fit for the future,' she says.

THE VARIETY OF THE WORKPLACE

As a young graduate, Huysmans was initially looking for work in the

biotechnology or pharmaceutical industry. 'I graduated as an industrial engineer in biochemistry,' she explains. 'In the meantime, I took a temporary position in the HSSE department of the European HQ of Chemical Producers.'

The office was on the doorstep of the Port of Antwerp, with twelfth-floor views of the harbour. 'I got triggered by all the activity. Suddenly an office environment seemed very boring,' Huysmans says. After making enquiries using her contacts at the company, a logistics manager put her in touch with the operations manager at the storage terminal. 'I didn't hesitate for

a moment when he offered me a job,' she says. And so began Huysmans' career in the tank storage industry.

Huysmans' current role focuses on four key areas: defining business objectives and models at a strategic level, change management, technical areas and project management. 'No day is the same,' she says. 'The global interaction with the primary industry that's demanding flexibility in finding storage solutions is often in contrast with the seemingly static character of the day-to-day business activities. One of the big challenges of tank terminals is not only to continuously seek solutions to maintain the balance between both, but to go beyond that and proactively anticipate changed market conditions.'

Her role is focused on the future of the market, ensuring that LBC Tank Terminals is fit for changes in the market. 'What I enjoy most is continuously being challenged by this worldwide network of business partners who not only expect, but also support the storage industry being brought to the next level,' she says.

PERSONAL DEVELOPMENT

'I have met some inspiring people during my career,' says Huysmans. 'Some of them have had a huge impact on my career development by showing me how to create and take opportunities for continuous personal development or how to lead by example.' Huysmans has held a variety of positions in the industry, driven by her own personal development and eagerness to learn. She considers this to be a key factor to her success in tank storage as she's tried her hand at various areas of the business. She understands



‘From the moment we start focusing on what human capital is really about, developing desired competences, the question on gender becomes subordinate’

the inner workings of many aspects of tank storage.

Rather than conscious discrimination, Huysmans suggests there are fewer women in the industry due to personal and career choices. ‘Regardless of the industry, in operational and technical positions there are indeed often less women than men,’ she says. ‘But it’s not necessarily that women get fewer opportunities than men. Often it is a personal choice as to whether they accept the opportunities offered.’

‘Over the years, I’ve learned not to focus on differences in gender, age, culture, etc,’ Huysmans continues. ‘We should simply be aware that they are there. Even better, I would say, every person is unique with strengths and working points. When collaborating, this should always be considered.’ Instead of focusing on the gender balance in the industry, Huysmans stresses the importance of a more generally diverse workforce: ‘Is the tank storage industry reflecting the diversity of society? Answering this needs to focus on diversity, reflecting today’s global society, rather than looking solely into gender discrimination.’

‘From the moment we start focusing on what human capital is really about, developing desired competences, the question on gender becomes subordinate.’



she continues. ‘Tank storage is like any other business; a reflection of society. So, in evolution on that, the key should be attracting the person with the highest capability to adapt and develop competences.’

THE FUTURE OF WOMEN IN TANKS

‘In general there is no difference working in the tank storage sector than in any other industry,’ says Huysmans. ‘I would recommend this industry to any other women. I have met so many inspiring people during my career and a lot of

them were addicted to the dynamics of our industry – just like me.’ As with all business, ensuring a healthy work-life balance and flexibility is key to attracting talent. ‘This creates more opportunities to combine raising children with developing a professional career,’ she adds.

With so many companies focused on ESG (environmental, social, governance) policies, Huysmans predicts the landscape of the industry will change significantly. ‘The sustainable and ethical impact of businesses and investments is being measured by the ESG criteria and is not only playing a prominent role in defining the future of our industrial landscape but over society in general. It will create a leverage to ensure society in general will look differently. Rather than needing a ‘women in tanks’ support group, gender will no longer determine who takes the position, competences will.’

For more information:

www.lbctt.com



01 LBC Tank Terminals
(source: Frank Dorren, AuviMedia)

02 Karine Huysmans, transformation manager,
LBC Tank Terminals
(source: @anvandaefotografie)

03 LBC Tank Terminals
(source: Frank Dorren, AuviMedia)

FIGHTING FIRES AND BUILDING RELATIONSHIPS

15 years on, Orcus Fire & Risk's Marcelo D'Amico speaks to *Tank Storage Magazine* about his journey to setting up a successful fire protection company

➤ **'ORCUS WAS** started in 2008 at an interesting junction in my life,' muses owner Marcelo D'Amico. 'I had just left a stable partnership in a similar company, and decided it was time to spread my wings and start my own. At the time I had a six-month old daughter, no paycheck, no health insurance, and another child on the way. Needless to say, it was stressful.'

'The business was really started in my head in the year 2000,' he continues. 'This is where I was put in a lucky position as a young fire protection engineer to audit 13 refineries in Brazil for the company I was working for.' D'Amico's lucky break was thanks to his language skills. 'I was the only fire protection engineer in the US that spoke fluent Portuguese.'

After completing the refinery audits, D'Amico was excited to share his new knowledge with company executives and do more for the business. 'As a young engineer they kept telling me 'no', which is a word I have never liked,' he says. 'So I used the next years to build relationships, hone my skills and understanding of the oil and gas and energy sectors, and developed a business plan in my head.' In October 2008, Orcus Fire & Risk was born.

FINDING A GAP IN THE MARKET

'Traditionally, fire protection engineering and its engineers work in the commercial sector, providing support for the design and construction of high-rise buildings, office buildings, shopping centers, conference centers, hospitals, etc,' says D'Amico. 'After my experience in Brazil, I was not only hooked on the magnitude and complexity of these facilities, but also was convinced oil and gas and energy sectors had little support from my industry.' The consequences of a fire can be catastrophic for terminals, so having a capable fire protection service engineer/consultant on hand is often crucial to saving lives and the assets they have designed systems to protect.

'The main challenge for the fire protection industry is to overcome old style thinking, using prescriptive codes and standards as a main protection methodology,' says D'Amico. 'More often than not, Orcus is

contracted to bring a fresh perspective on fire protection systems using a risk/performance based approach that provides practical and cost effective solutions to complex problems.'

And as the industry transitions more towards future fuels, the challenge for the energy sector will be to ensure assets are protected as facilities grow. D'Amico explains: 'The fossil fuel industry is not going anywhere, but the renewable and alternative energy sector is growing, and with that growth comes unique fire hazards that are not part of everyday codes and standards. Orcus is the tip of the spear when it comes to research and development of different technologies to address the storage of renewable and recycled fuels.'

GROWTH AND FUTURE PLANS

Over the past 15 years, Orcus has supported over 1,100 individual projects with over 150 different clients. In 2008 the company's services only included fire protection engineering, but it has since grown to include risk engineering and modeling, process safety, emergency response consulting, procurement

and installation management, as well as complete design/build projects at a client's request.

In particular, the last seven years have been dedicated to the research and development of three main technologies:

Self-Expanding Fire-Fighting Foam (SEFFF) which is ideal for facilities that don't have access to a water supply. Orcus has executed over 20 different tests using SEFFF to better understand its impact on different applications and fuel types; using both C6 foams and Synthetic Fluorine Free Fire-Fighting Foams.

Firelce which is a water additive solution that provides a thermal barrier and reduces the amount of cooling water required by 80%. Orcus has executed laboratory scale tests to better understand coating thickness, application rates, and nozzle specification for thermal protection as an alternative to NFPA standards and API recommended practices.

Synthetic Fluorine Free Fire-Fighting Foams This is now a requirement in many US states for new projects or replacement of old C6 and C8 AFFF foam systems. Orcus has executed over 50 individual tests using different manufacturer foam concentrates to better understand which application rates are successful using different discharge devices on different types of fuels.

And the innovation never stops. D'Amico has high hopes for the future: 'The next 15 years will be focused on empowering our employees and give them the ability to work on some of the world's most interesting projects with the knowledge that creativity and thinking outside of the box will be rewarded by our executive team and our clients.'

For more information:

www.orcusfireandrisk.com
+1 832-860-1255



01 Marcelo D'Amico, Principal/lead fire protection engineer and owner, Orcus Fire & Risk



WHO SHOULD JOIN?

The FETSA Supplier Partnership is open to companies that do business with tank storage companies or have an affinity with the tank storage sector. This includes, but is not limited to:

- ➔ Technical equipment providers
- ➔ Companies providing safety services
- ➔ Fire fighting/protection companies
- ➔ Loading equipment manufacturers
- ➔ Companies providing auditing and management systems
- ➔ Tank farm construction and maintenance companies
- ➔ Surveying companies
- ➔ Port authorities
- ➔ (Tank) Cleaning companies
- ➔ Electrical & Instrumentation (E&I) control automation services
- ➔ Database providers
- ➔ Magazines and other industry publications

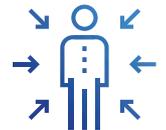
WHY SHOULD I JOIN THE FETSA SUPPLIER PARTNERSHIP?

We offer you privileged access and visibility to senior decision makers in the tank storage industry through our events, publications and meetings. Specific benefits include:



NETWORKING: One complimentary ticket to attend our Annual FETSA Conference and AGM Dinner exclusively dedicated to FETSA members, conference speakers and high level stakeholders from the EU political environment. First option for sponsorship opportunities around the Annual Conference and related events.

VISIBILITY: Name and logo with summary of services offered will feature on a dedicated Supplier Partnership page of our website and will be included in our communication tools such as the FETSA website, the monthly newsletter and the annual management report which are circulated to senior industry executives. You will be entitled to draft an article in a quarterly supplier partnership newsletter.



FETSA KNOWLEDGE EXCHANGE: Possibility to organise industry seminars on relevant topics and/or with the approval of the relevant chair/secretariat to present new/emerging technologies and legislation to our committees/task forces.

PART OF OUR COMMUNITY: Use of FETSA meeting rooms in Brussels at preferential prices (subject to availability). You can use the FETSA logo on your website and printed materials in order to state that you are part of the FETSA supplier partnership.



INSIGHT: You will receive our exclusive members only newsletter and annual management report so you are kept informed about the challenges we face in EU policy.

PRICE

- Annual fee of EUR 2500 (excl. VAT).
- Billed annually at the start of the subscription period (1 January).
- All applications for Supplier Partnership are subject to approval the FETSA Executive Committee, and subject to the terms and conditions set out in the Supplier Partnership Agreement.
- Competition law must be respected.

IMPROVE PRODUCTIVITY WITH FLEXIBLE WORKING

Fatima Shafique shares some HR secrets, following the success of Sharjah National Oil Corporation's new working patterns



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> DURING THE Covid lockdown, a huge number of companies were forced to ask their staff to work from home. While a number of countries and companies have continued to enforce this, many employees have had to resume office working, after continuing remotely for over 12 months.

Focusing on employee well-being is crucial to ensure employees' productivity and their satisfaction with the company. Remote working during the pandemic helped many employees achieve a better work-life balance, as they were able to spend more time with their families.

As such, the transition back to full time work has been difficult for employees and studies have shown that this is causing more absenteeism, low motivation and lower productivity levels, especially for millennials and gen Z's. Employees had become accustomed to flexible working hours.

ASSUMING NEW WORKING PATTERNS

From 1 January 2022, the public sector of the United Arab Emirates adopted a new workweek. The order caused federal government organisations to switch to a four-and-a-half-day workweek, with Friday afternoon, Saturday, and Sunday constituting the new weekend. On Fridays, federal government employees were also given the option of working remotely, with flexible hours.

Economically, the order aimed to strengthen foreign commercial ties and better integrate the nation with world markets. The updated structure would also support work-life balance and improve wellbeing.

The Sharjah government chose to adopt the policy of four-day workweek, and while private sector companies were not obligated to follow suit, many of them did. This is because, despite being optional for private companies, when schools changed to the new workweek, the business sector had to align to accommodate working parents.

Moreover, many private sector companies have benefited from better trade and transaction facilitation with the majority of nations outside the region and alignment with global markets.

THE IMPACT OF SHORTER WEEKS

According to the Sharjah Executive Council's on 9 August 2022, the change to a shorter workweek at the beginning of the year has improved consumer and employee satisfaction levels. In the first three months of this year, the emirate saw a 40% decrease in traffic accidents and fatalities compared to the same time last year, reflecting its effects on the roadways as well. The emirate also reported a notable decrease in greenhouse gas emissions, including nitrogen dioxide, sulphur dioxide, and carbon monoxide.

Providing employees with flexibility in their working hours and weekend options helps them maintain a work-life balance and increases productivity. Employees are also able to focus on their mental health, by having more time to pursue personal endeavours and spend time with their families. The new weekend policy also makes it possible for employees to pursue further studies, new trainings, or additional travel – which would have been much more difficult with the previous workweek. Many people also highlighted time and expense savings from commuting, as well as a better ability to deal with care responsibilities, as important benefits.

Working techniques can be developed, and old technology and equipment issues can be targeted to ensure that they provide the proper amount of support for truly effective post-pandemic working methods. Access to technology, work flexibility, and individual abilities are all different considerations for flexible working schedules.

THE CASE OF SNOG

Any method of working that takes into account the various needs of the company or employee falls under the broad definition of workplace flexibility. In reality, however, workplace flexibility typically refers to a certain set of procedures. As the UAE has adopted a shorter week in the beginning of 2022,

Sharjah National Oil Corporation (SNOC) had to develop a new procedure to adapt to the new weekend. SNOC decided to promote work hour flexibility by providing its employees with multiple weekend options.

SNOC employees were given three flexible weekend options. They could choose a work schedule to match the Sharjah government, the new UAE workweek or the previous UAE weekend option. These options were circulated to all employees and included any information regarding the impact their choice could have on leave entitlement, etc, and a meeting was conducted to address any questions.

Each employee adopted a new option based on personal preference and a survey was conducted to evaluate the effectiveness of the new weekend policy and its impact on business and team performance after three months.

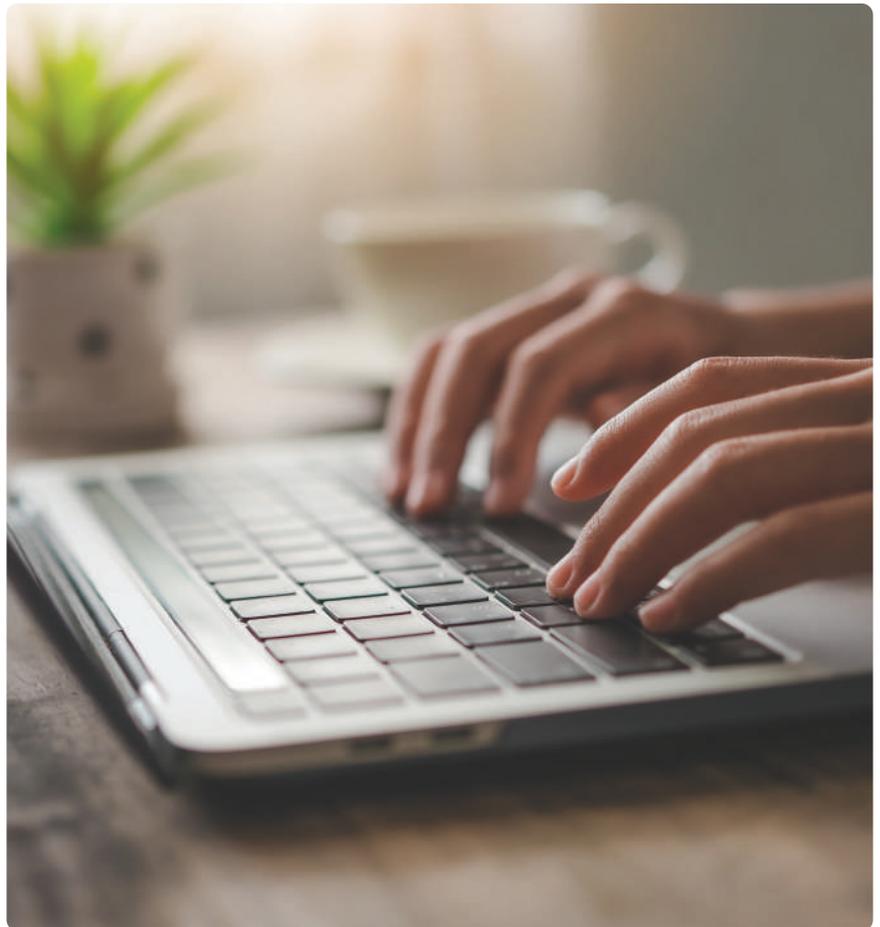
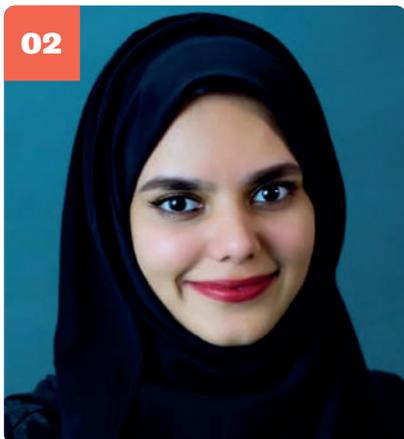
SNOC has employed a compressed workweek model, where the typical 40-hour workweek is condensed into fewer days during the week. That means, in exchange for an extra day off, employees work extra hours on some days. The benefits of this model include:

- Increased work-life balance as a result of the extra day off
- Reduced commute time and expense
- Extended office hours of operation
- More personnel on hand during a time of increased workload

Since the implementation of the new weekend policy, the majority of SNOC employees have noticed a positive change in their productivity and agree that the flexible options have provided them with more work life balance, without having any negative impact on their work productivity.

FLEXIBILITY TO CHOOSE

According to a study by the CIPD, and based on a YouGov poll conducted



in June 2020, an ‘unprecedented’ rise in remote working is fuelling a ‘unprecedented’ rise in productivity. 61% of companies claimed that employees reported a better work-life balance as a result of working from home. Furthermore, 43% felt the shift has boosted employee collaboration, and 38% stated their employees’ focus had improved.

Despite all of the advantages of working from home, the survey concluded that there were some drawbacks. Nearly half (47%) of companies cited employee mental health as a source of concern, along with issues with employee interaction (36%), and difficulty managing home employees (33%).

However, an improved work-life balance is considered as a crucial benefit of remote working, according to the case study interviews.

As a result of the new mode of working, several businesses have observed a stronger focus on tasks and more streamlined communication. The results of the poll are broadly consistent with the case studies, indicating that the new mode of working has had no negative impact on productivity.

Indeed, some findings suggest that those who work from home are more

productive than those who work full time in an office.

The freedom to plan their own schedule and discover flexibility is one of the reasons why so many individuals like the concept of flexible working. SNOC has taken this into account and has worked with employees to assist them in finding a balance between home and work duties.

For more information:

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02 Fatima Shafique, Assoc. CIPD, PHRI, PMP, HR Generalist, Sharjah National Oil Corporation

DEMAND WEAKNESS COULD BE THE REAL OIL PRICE CAP IN 2023

Paul Hickin, director at S&P Global Commodity Insights explains how changing demand for crude oil could impact the next 12 months



> THE GLOBAL oil supply map may be reshaped indefinitely after the fallout from the Russian invasion of Ukraine and subsequent G7 sanctions and price cap on Russian crude.

But the potential impact from the downturn in demand may be even bigger, given uncertainty over the consumption picture in China as well as broader economic weakness globally. Volatility is likely to be the only constant in 2023.

Oil demand is being simultaneously challenged by Covid-related lockdowns in key consumer China in the East, and by slowing economies in the West, exacerbated by inflationary pressure and higher interest rates.

DEMAND IN ASIA

S&P Global Commodity Insights analysts predict that oil demand will increase by an average of 2.3 million b/d on the year in 2022, with growth moderating to 2.0 million b/d in 2023.

This is a far cry from the outlook in early 2022, when booming oil prices saw the S&P GSCI key commodity index hit record highs, with the prospect of a new supercycle.

But much still hangs on China, which has been adversely impacted by its ongoing Covid-19 policies, despite recent changes in protocols and measures taken to stimulate growth. While Asian oil demand is expected to rebound strongly in 2023, China is a wildcard, providing risks both to the downside and upside.

IMPACT OF RECESSIONS

In the West, both the US and Europe are sliding towards mild recessions, which will play out in the first half of 2023. 'The impact of central bank tightening and elevated energy prices, globally, remain the most acute headwinds, though geopolitical flash points remain a concern, as do financial sector risks,' analysts at S&P Global note.

They predict that Dated Brent will average \$87/b (€82/b) for 2023 as demand weakens, down from around a \$100/b (€95/b) average in 2022.

However, the demand weakness comes amid key supply-side vulnerabilities which, under more normal economic times, may have caused more persistent triple-digit oil prices. Indeed, Dated Brent shot up to close to \$140/b (€132/b) back in March after the outbreak of the Russia-Ukraine war, before it became clear that Russian oil flows would not immediately be impacted as much as many had expected and with the emergence of global inflation risks.

Even if there is another spike in prices, the likelihood is that this will only fuel inflation further and ultimately erode demand, bringing those prices back down again quicker than usual.

GLOBAL SUPPLIES AND FLOWS

Meanwhile, the G7's recent \$60/b (€57/b) price cap on Russian crude and an incoming clampdown on oil products from February are expected

to further shake up global seaborne oil trade as Russian deliveries struggle to find new buyers. Most eyes are on Asia and the extra volumes it can potentially handle. But Asia has already boosted its purchases of Russian crude since the war began, with more than 2 million b/d in additional flows having been redirected to buyers in the region – half of that going to India – even before the latest sanctions.

Indeed, Asia needs to plug a supply gap created due to more US and African crude now being diverted from Asia to Europe. But the challenge will be finding alternative shipping insurance and non-EU vessels to allow oil to continue flowing into the region amid sanctions.

The other key factor on the supply side is OPEC+, with the oil producer group and its Russian-led allies commenting after their meeting on 4 December that they would maintain their production restraint for now, adopting a wait-and-see approach. That decision means the 2 million b/d in output quota reduction from October levels will remain in place until the fallout from EU sanctions and the G7's price cap becomes more clear.

OPEC+ has noted that the group's next full meeting will be in June, but has said too that it will act with agility should prices or market balances quickly change. It may need to, given that 2023 is unlikely to be any less turbulent than 2022.

For more information:

www.spglobal.com/commodityinsights

DISRUPTIONS TO THE GLOBAL MARKET

FETSA's executive director, Ravi Bhatiani, examines the effects of new EU restrictions on the global energy market

> IN DECEMBER, the EU's restrictive measures on crude oil imports came into effect, as well as a price cap on crude oil. In February, restrictive measures on refined products will also be introduced, with the expectation of a further price cap to follow to cover these impacts.

The precise consequences of these measures cannot be predicted with any certainty because this is the first time in recent history, in an interconnected world energy market, that such a drastic intervention in market forces has been introduced – with severe legal consequences for anyone who tries to circumvent this policy.

At FETSA, we have been working with our members, our supplier partners, the International Energy Agency, strategic stockpiling authorities and the European Commission to look at potential impacts, worst case scenarios and policy options to mitigate any negative consequences. But there are still several large unknown facets, adding a layer of uncertainty into any scenario planning.

The most important questions are:

- Will there be security of supply of both crude oil and various refined products with the changeover from pipeline based product flows into Europe to shipborne flows into Europe?
- Can logistics systems cope with the modal shift in oil logistics?
- What measures can be taken to mitigate any interruptions to supply?

It is difficult to analyse these issues, without knowing the level of demand destruction that will be caused by inflation, high prices and the current recessionary outlook.

It is also difficult to take into account the impact of fuel substitution that is occurring due to high gas prices and gas insecurity. This has been stimulated by post-Covid demand and, most prominently, by Russian flows not being adequately replaced by LNG imports, plus the higher cost of those LNG imports compared to Russian piped gas.

This being said, we can attempt an analysis based on IEA fuel switching figures as well as looking at the future

curve in specific products to see how the market interprets the risk of supply and demand being mismatched.

NEW FLOWS AND MODALITIES

It seems likely that Europe will be able to receive sufficient crude oil from non-Russian producing countries and this is borne out by shipments starting to increase from Gulf countries, India, the USA, North Africa and Turkey to name a few such regions.

The challenge is getting it from coastal terminals to inland refineries and users. There are very valid questions about the state and preparedness of the European rail network and its ability to handle additional energy traffic. There are questions about the ability to maximise inland waterway transport in the summer months, which is becoming a dry season with low water levels in Europe. There are also questions about having enough staff to operate terminal loading facilities, logistics hubs, railcars and trucks for the increase in non-piped transport.

The impact of using non-Urals crude oil in European refineries has been well explained in recent press reports and research. This is likely to leave the EU and neighbouring countries in the EEA with deficits in diesel production. It is hoped that this impact can be mitigated through increased imports but there are several outstanding questions related to this.

As with crude oil, can logistics handle the additional stress? Are there sufficient vessels able to carry the product into Europe and are the onward logistics sufficiently staffed to progress the products further into central and eastern

Europe? There are the same rail and inland water way constraints as we have with crude oil.

POTENTIAL SHORTAGES

This leaves us with the conclusion that we need to prepare together with all parts of the supply chain and government on what to do in case of a shortage situation or interruption in supply e.g. due to blockades, shipping traffic interruptions, or other unforeseen issues.

A first tool is strategic reserves. Are they sufficiently accessible given existing logistics challenges and is the product mix appropriate to cover shortfalls in diesel supply, for example? Do we need to think about the IEA 10-point plan for demand reduction? This is a worst case scenario but it could be that we see governments implementing home working, jet fuel rationing, speed limits etc.

Do we need to think about optimisation in distribution and logistics to make sure shipments can be directed to available jetties? This would require clearance from competition authorities. Would we need to see solidarity agreements between EU Member States to guarantee cross-border product flows in case of shortages in a given EU Member State?

All these topics need to be discussed now to prepare for potential interruptions. Even if logistics work well and adapt well today, it makes sense to have these discussions on contingency planning.

For more information:

www.fetsa.eu



TECHNICAL NEWS: GLOBAL INDUSTRY UPDATES

Ecopetrol Group

ECOPETROL GROUP AWARDS ROSEN FOR SUSTAINABLE ENERGY

Ecopetrol group, a Colombian petroleum company, has recognised global solutions provider, ROSEN, as an iconic supplier with inclusive and sustainable energy. ROSEN was awarded second place in Ecopetrol's innovation and technology category.

Ecopetrol presents this award to highlight suppliers that leverage the sustainable development of nations with the design of innovative products or services and outstanding practices in environmental protection.

Leonardo Mendoza, business execution director for ROSEN northern South America says: 'Thank you very much for this important recognition in innovation. At ROSEN, we insist on providing the best of technologies and services based on ethical behaviour, protection of people and the environment. This recognition is a demonstration of our value proposition: helping operators ensure safe and efficient piping systems, maximising product uptime and performance, and protecting the environment.'

Implico Group

IMPLICO GROUP APPOINTS NEW CEO

Global digitisation specialist for energy, Implico Group, has repositioned its management team, announcing Rolf Adam as CEO. This comes after CEO Tim Hoffmeister leaves at his own request after four years with the company.

Regarding his leave, Hoffmeister says: 'In the last years, we have reorganised our internal processes and structures, we have successfully built up our partner network, and we have positioned ourselves as a thought leader in the energy industry. On this sound foundation, Implico will develop itself further as a global product company with major international customers. Now that this milestone has been completed,

I deem it a good time to hand over the reins and take on new challenges outside the company.'

Succeeding Hoffmeister, Rolf Adam will assume responsibility for the Implico Group. He is a proven expert at the interface of digitisation and cloudification with many years of international management experience in the energy and IT industries.

Hydrogenious LOHC Technologies

HYDROGENIOUS APPOINTS NEW CCO AND CSO

Hydrogenious LOHC Technologies, a hydrogen storage and transportation technology company, has appointed Toralf Pohl as new chief commercial officer (CCO) and promoted former head of strategy, Andreas Lehmann, to chief strategy officer (CSO).

Daniel Teichmann, CEO and founder of Hydrogenious LOHC Technologies says: 'We are happy to have two new C-level executives with Toralf Pohl as CCO and Andreas Lehmann as CSO. Andreas Lehmann has been our head of strategy since he joined the company in 2020 and is already well established with Hydrogenious and our partners...I am particularly happy that we were able to win Toralf Pohl for our company. With his extensive experience in the renewable energy industry, he will further develop our commercial and sales organisation and enable significant growth both in Europe and internationally.'

Advario

ADVARIO JOINS HYDROGEN COUNCIL

Liquid storage logistics company, Advario, has announced it is one of the newest members of the Hydrogen Council.

The CEO-led organisation has a shared vision for hydrogen to rapidly advance the global clean energy transition for a more sustainable and resilient energy future. The move reflects Advario's commitment to enable, support and

expedite the energy transition.

Bas Verkooijen, CEO at Advario says: 'We are very pleased to join the Hydrogen Council. Our membership reflects Advario's ambition to play a front-runner role in developing the hydrogen value chain and overall hydrogen ecosystem, leveraging our expertise and capabilities in import and export structures and logistics solutions. We are deeply rooted in the belief that partnerships drive true progress, and trust that we can accelerate the energy transition together with the other members of the Hydrogen Council to realise a greener, more sustainable future.'

Welcoming Advario to the panel, Yoshinori Kanehana, co-chair of the Hydrogen Council, says: 'The Council has seen strong growth this year with a total of 22 new members from a wide range of geographies and sectors. This highlights the rising interest in hydrogen and affirms hydrogen's vital role to realise a cleaner and more sustainable society.'

ACE Terminal

EGBERT VRIJEN APPOINTED PROJECT DIRECTOR ACE TERMINAL

ACE Terminal has appointed Egbert Vrijen as project director. ACE Terminal is the joint project of Gasunie, HES International and Vopak, in which they are developing a terminal in the port of Rotterdam for the import of ammonia as a green hydrogen carrier. Egbert Vrijen, with his 20 years' experience in the capital-intensive industry, will fulfill the ACE Terminal project together with the core team, which consists of representatives of the three partners.

The ACE Terminal project is making good progress and has received a lot of interest from the recent market consultation. Discussions with a large number of market parties have provided insightful and valuable information, which can now be used to take the next steps for the development of the ACE Terminal.

Mettler Toledo

METTLER TOLEDO INTRODUCES THREE-IN-ONE ANALYTICAL INSTRUMENTAL

Mettler Toledo has introduced a new instrument that analyses liquid, and translucent samples for their optical spectrum, colour, and water parameters. Using the new device, Easy VIS, operators can speed up their processes and improve the quality of results – saving time, money and space.

The tool can be used instead of three separate instruments: a colorimeter, a spectrophotometer, and special measuring methods for water testing, such as titration.

Easy VIS is one of the next-generation EasyPlus UV/VIS spectrometers produced by Mettler Toledo.

Easy VIS will typically be applied in the QC lab at small manufacturers in the food and beverage industry, environmental testing labs, or any industry needing quality control and supervising their processes or wastewater. It can be applied to multiple steps of the production process: inspection of raw materials, quality control of semi-finished and finished products, or testing the water quality of wastewater.

Siemens Energy

SIEMENS ENERGY BEGINS WORK ON AMMONIA CRACKER

Siemens Energy has started work in Newcastle, UK, on a new £3.5 million (€4 million) ammonia cracker prototype designed to produce green hydrogen at an industrial scale and help tackle climate change by reducing carbon emissions. This is in development with global resources leader, Fortescue Industries and renewable energy company, Geopura.

The ammonia cracker system will provide the potential to produce green hydrogen at scale, wherever and whenever it is needed. The system will be designed to deliver high-purity hydrogen, suitable for PEM fuel cell use, using FFI's Metal Membrane Technology (MMT) purification process.

Steve Scrimshaw, VP at Siemens Energy UK & Ireland and a member of the UK government's hydrogen advisory council

says: 'We have just 13 years to deliver a net-zero electricity grid for the UK. Time is running out and we can't do this alone. This innovative green ammonia cracker could be a game-changer for scaling up the green hydrogen industry – an important step to drive the energy transition.'

Emerson

EMERSON LAUNCHES PRESSURE-REDUCING REGULATOR

Global technology company, Emerson, has launched a pressure-reducing regulator specially designed for use onboard commercial hydrogen fuel cell vehicles.

The dual stage and patented active seal design of the TESCOM™ HV-3500 Hydrogen Onboard Regulator delivers steady pressure and constant hydrogen fuel supply to fuel cells in the full range of vehicle operating conditions. This extends fuel cell life and maximises fuel usage. The reliable fuel pressure provided by the HV-3500 allows operators to drive further without refuelling and decreases the risk of over pressurisation downstream, which can result in leakage, wasted fuel and possible emissions.

The HV-3500 has been designed and engineered in compliance with EC79 requirements for pressure regulators used in hydrogen vehicles. By boosting fuel cell efficiency and maximising overall energy efficiency, the stable pressure the HV-3500 provides also reduces maintenance frequency.

Koole Terminals

KOOLE TERMINALS PARTNERS WITH FALCKER FOR AUTONOMOUS DRONE USE

In October, Koole Tankstorage Botlek (Koole Terminals' Rotterdam facility) began a pilot of autonomous drone checks for tank leaks. The facility at the Port of Rotterdam, Netherlands, is an industry-first.

The pilot will last until September 2023 and the drone will work alongside the manual process. This will allow Koole Terminals to test whether everything works properly. The autonomous drone is a drone-in-a-box system from Percepto, with its own cylindrical, waterproof housing where the drones charges up and exchanges data. It has an ordinary camera and thermal camera on board.

And the operation of the drone depends on Falcker's software. This system integrator provides technical support and joins Koole Terminals in constantly refining the drone's functionality.

The primary purpose of the drone pilot is to understand and recognise leaks of liquid products that Koole terminals store and transship. The software used by the drone will compare images, constantly making the drone smarter thanks to cutting-edge artificial intelligence.

Koole is required to check the entire installation for leaks several times per day. The drone will fly when a ship docks and when a product is being pumped. The information is fully integrated into the terminal's route control system. Supported by this control system drone flies pre-set routes and will fly at frequent intervals for standard checks.



TECH FOR TANKS

Molly Cooper explores how and why technology in the tank storage sector has evolved so quickly over the last few years



01

DIGITALISATION and automation is changing the landscape of the tank terminal, energy and petrochemical industry. It's the way forward and the industry is leaving pen and paper behind. Catherine Reijans at Sprint Robotics comments on the current state of innovations and robots: 'The leaps and bounds technology has made in the last year is incredibly impressive. By bridging the needs of asset owners with available robotic solutions, we continue to help accelerate deployment and scaling of inspection and maintenance robotics on a large scale.' The industry is moving forward, using technology to improve safety, streamline processes, optimise terminals and protect the environment.

INNOVATIONS FOR ISSUES

There are three main problems that emerging innovations look to provide solutions for. The first one is safety. Safe working is a huge part of a business's success and technology can be used to remove humans from hazardous situations. Jobs that once required humans to enter into confined and dangerous spaces can now be eliminated.

Secondly, asset owners have to think about the economic benefits they can achieve, especially as the industry transitions to future fuels. Costs of operations are rising and companies want to make savings without cutting corners. Many of these new technological innovations can save money by using fewer resources in their processes.

With the energy transition at the forefront of industry concerns, environmental factors also need to be considered; ranging from community interaction to emissions management. Across the world 25% of methane emissions come from the oil and gas industry and the value of leaking gas is estimated to be €28.9 billion according to the Rhodium Group. So, it's vital that the industry looks to reduce emissions.

DRONES

Drones have been increasingly popular as the tank storage industry shifts away from humans entering tanks. According to Global Data, the drone market is forecasted to grow from €13.2 billion in 2021 to €86.5 billion by 2030 due, in part, to the significant adoption of drones in the oil and gas industry.

'We stand out because we were the first company to create a drone meant only for flying inside dangerous confined spaces,' says Zacc Dukowitz at Flyability. Prior to this technology, humans were entering storage tanks for cleaning and inspections. This was risky work. Workers could suffer from eye irritation, dizziness and nausea, as well as more serious consequences such as lack of oxygen and exposure to harmful vapours. There was also the increased risk of falling or injury due to working at height. These factors meant that only qualified and authorised personnel could carry out these tasks.

Drones are not affected by these risks. Flyability's Elios 3, is a collision-tolerant

drone equipped with a Lidar (light detection and ranging) sensor, which allows it to create 3D maps in real time using a SLAM (simultaneous localisation and mapping) algorithm. This allows pilots to continue flying in dusty and unclear environments, where the camera can be almost completely blind. The 3D live map also allows inspectors to ensure full coverage for their inspections, because they can see exactly where the drone has flown within an asset. This removes the need completely for human inspection and improves terminal safety. 'By using one of Flyability's drones, inspectors can collect this data remotely instead of in person, removing them from the hazards of confined space entry, work at height, and work on ropes,' says Dukowitz. Plus, the drone's collision-tolerant technology includes a protective cage that allows it to crash into things and continue flying unharmed. It is able to recover from flipping upside down too.

Similarly, inspection drone company, ScoutDI, has created tethered, Lidar-equipped inspection drones for inside confined spaces. 'Most jobs use climbers, rope access, scaffolding or rafts to do visual inspections of vessels, tanks, silos and other confined industrial spaces. These methods are dangerous, time-consuming and expensive,' says Eivind Sivertsen from ScoutDI. Whilst operating the ScoutDI drone, the pilot is able to stay on the floor of the volume, or even completely outside of it, protected from potential hazards.

A tether allows for uninterrupted inspections as all communications and



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control signals are transmitted this way. The ground station can be connected to the internet and be used to livestream the entire inspection to an online portal. 'In turn, the pilot doesn't lose control, as could happen with a wirelessly controlled drone. Overall, the situation on site is easier for the pilot and allows for a greater focus on the job,' explains Sivertsen.

The key is ensuring the drone has enough lifting power without getting too heavy. 'The more equipment you install, the heavier it becomes. We couldn't just add more powerful motors and larger propellers to create more lifting power. The autonomy and navigation properties and stability of the drone had to be good in order to create good visual data,' says Sivertsen. A drone that's unstable and jumps around is prone to create blurry video footage which is not fit for purpose.

Voliro also faced some challenges when creating its NDT drone, Voliro T. A regular quadcopter would be too turbulent for a confined space: Voliro's drone requires accurate contact to apply pressure for NDT. The Voliro T can steer the sensor to any location at any orientation and hold it against the surface with up to 3kg of force. It can perform inspection and maintenance tasks more quickly, safely, and in a cost-effective way, compared to traditional methods.

Much like ScoutDI and Flyability, Voliro's drone tech is focused on safety. 'The Voliro T is highly adaptable, performing many tasks in one place at one time. For example, at the same refinery, it is feasible to move to the next location and begin inspections with minimal preparation,' says business development manager at Voliro, Chris Udell. It's able to move to an additional storage tank, overhead pipeline or flare stack. This means no humans are put in danger from moving equipment, safety apparatus or themselves from one site to another.

EMISSIONS TECHNOLOGY

Governments around the world are pushing asset owners to solve the issue

of methane emissions. To understand the importance and costs of leaking emissions, Iwan de Waard, director at ExRobotics, says: 'In the United States, fugitive emissions from the oil and gas industry total an estimated 13 million metric tonnes per year, amounting to \$2 billion (€1.92 billion) in lost revenue. Globally, the value of leaking gas is estimated to be \$30 billion (€28 billion).'

The emissions detector robot from ExRobotics uses AI to appeal to the challenges assets owners face. De Waard says: 'Terminal operators need to be able to detect a small emission before it becomes a bigger leak.' In an ideal world, terminal operators would want to detect emissions at low levels and to know the exact location of the leak. After pinpointing the leak, the problem can be scheduled for the next maintenance round and fixed before the emissions are visible to satellites or other detectors. However, ExRobotics' emissions detector can locate a leak and collect relevant data before it becomes a larger spill.

Currently, the AI robots follow pre-recorded missions, but ExRobotics plans to release a new software that will allow the robot to reason and make decisions

on its own. 'Autonomous robots are taking the world's first baby steps. The future possibilities are endless,' says de Waard. ScoutDI goes into more detail on autonomous robots on page 52.

While the robot is on the ground level, some emission detection can happen in the air. Aeromon has been developing an airborne emission mapping device to detect emissions and their severity. 'Our system is designed to give flexibility during measurement operations. We provide the ability to monitor emissions efficiently over wide and challenging infrastructure, or otherwise hard to reach places,' says Lucien Moolhuizen at Aeromon. This saves time and increases work safety during the operations as humans no longer need to make attempts to enter difficult spaces.

ROBOTS

Robotics have developed massively in recent years and they now have the ability to improve data collection, safety, and save on cost of tank storage inspection. Robotics are quickly on the way to removing all human elements from inspections. The key is finding the right inspection approach.

Nobleo began work on its fully autonomous tank-cleaning robot in 2018. When first showcasing the product they found most asset owners were enthusiastic, but suppliers were skeptical on how to implement this innovation into practice with traditional ways of working still in place. 'We still saw a need for more efficiency with remotely operated crawlers, especially in situations that do not have a clear line-of-sight,' says Rik Kruidhof, business unit manager autonomy at Nobleo.

Nobleo is focused on safety and solving the challenges of working with a limited sight or in no human entry situations. By



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using Nobleo's technology the customer gets fewer tank-entries, unless it's unavoidable and more efficiency and oversight in projects where there is a limited line-of-sight. In the long run, safety and efficiency of work are both improved by the use of technology.

For the limited line-of-sight or no-man entry situations, Nobleo developed an add-on kit that provides 3D augmented reality. Kruidhof explains: 'In this virtual world the operator can move around freely to get a better oversight of the current situation and of the work already done.' In turn, this allows a better overview of the surroundings and the robot can collect data for traceability and reporting. 'This enables the collection of all kinds of data from the work that is being done,' says Kruidhof. Nobleo's new focus is on a crawler that can automate challenging tasks such as grinding, welding, etc. in difficult locations with limited effort.

Waygate Technologies also uses 3D technology for navigation and to create a digital twin. The technology provides semi-autonomous control, geo-tagging of inspection data and the digital twin. Inspection reports can be generated automatically and the data can be uploaded onto asset performance management systems. 'The approach covers the full process chain, starting with a straight forward modelling of the asset geometry,' says Ekkehard Zwicker, general manager of robotics at Waygate Technologies. This supports risk-based inspection approaches, further aiding in implementing digital integration at tank storage facilities.

Over the last few years the technology has been developed with the aim to simplify and streamline the inspections

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process and to support a range of inspections such as visual, ultrasonic and more. The asset owner can now have seamless integration on this tech into their digital strategy.

Waygate Technologies' robotics also help avoid human entry into confined spaces, or working at height. Automating the inspection process increases efficiency and saves valuable production time. Zwicker believes that fully researched robotic technologies such as 3D dynamic reconstruction will be integrated step-by-step in the tank storage industry. He says: 'The interoperability of drones and crawlers is on the horizon as well leveraging the advantages of both approaches.'

Another element where safety can be improved is in chemical tank cleaning. Robot ++'s robot is used in the grinding and removal of rust from metal structures. It is able to achieve a grade of SA (standard abrasive) 2.5, a classification for paint and rust removal, meaning a very thorough blast cleaning after operation. Charles Marcotte, director at Robot ++ believes: 'The most innovative feature of this robot is that it achieves the auto-tracking and auto-grinding of welding seams which can be applied to different height and sizes.'

The chemical tank cleaning robot improves safety in the workplace by minimising operators working at height or confined spaces. Alongside this, it reduces costs for scaffoldings or rope-access. Customers are able to use the robot to replace manual operation.

The vast majority of grinding works are still done by humans which can have many implications, such as long-term health issues from residue or hazardous materials, and falls and injuries as the work is at a height. 'In the future, we hope to modularised to reduce the human effort and time spent in maintenance

while offering the possibility to have an active module for other works such inspection or maintenance. We want to push on the automation of the robots,' says Marcotte.

MAPPING TOOLS

Digital mapping can be used to aid with inspections such as Flyability's drone, creating a digital twin like Waygate's robot and more, like corrosion or emission mapping.

Aeromon's emission mapping device is primarily a sniffer tool, which continuously pumps sample air through a series of sensor modules. It has a lightweight design and is extremely versatile so can be used on drones or by hand. In addition to emissions, the sniffer tool also continuously monitors atmospheric parameters like temperature, pressure and humidity. Aeromon wants to continue to challenge the way emissions are monitored today and bring its technology into the mainstream as an effective tool for HSE and maintenance professionals.

Saudi Aramco's thermal imaging innovation was developed in 2021 and is used to create visual tank maps. It can detect the thinnest part of the tank metal instead of the traditional scanning process. 'The innovation utilises two physics principles, specific heat and heat transfer, for utility services,' explains Ziad Oqifi, NDT and corrosion management unit head, at Saudi Aramco's community services technical support department.

The specific heat temperature of water is four times more than the specific heat temperature of air, which results in significant heat transfers that create cold spots during warm weather. 'The thinner the metal, the higher the heat transfer,' says Oqifi. So, the thermal imaging can detect where heat transfer is highest and determine where a tank is thinning.

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This thickness measurement process is more efficient and offers higher precision leading to time and cost savings. This traditional non destructive testing (NDT) process can take nine to 24 days from the time of notification to the time of closing the inspection. The new technique can reduce this to just four days. With Saudi Aramco's technology, the system notification is received, the NDT readings are taken, and then the system notification is closed. This results in a 93% reduction in operational costs associated with scaffolding because the thermal imaging and mapping has already been taken using crawler robots to take thickness measurements on the thinned areas rather than scanning.

To further increase cost savings, in the future, Saudi Aramco wants to deploy drones with thermal imaging to accelerate the process, but also, higher precision results. This is economically beneficial and will produce a higher data collection yield.

LASERS

Lasers can also help with cost savings, precision and minimal resources, with the added bonus of zero waste and pollution. Global Asset Solutions B.V (GAS B.V) has created a laser tank cleaning technique technology that's non-abrasive. This cleaning technique is different from the traditional grit or sand-blasting methods which can cause damage on a tanks surface. 'We initially saw the advantages of the technique in pre-processing surface conditions for performing NDT. But soon we saw other advantages too,' says Dennis Vos, co-owner of GAS B.V.

Laser tank cleaning doesn't require additional materials or abrasives so



INNOVATIONS IN ACTION

DRONES FOR IMPROVEMENT

Flyability's Elios 2 drone was used at an oil depot for a diesel tank inspection. As well as improving safety onsite by removing humans from hazardous situations, the inspection time went from two weeks to four hours, saving \$35,000 (€35,800). That's a cost saving of 96%!

LASERS FOR CONTAMINATION

When a large Norwegian client in oil and gas industry needed an asset examined, GAS B.V performed a full laser cleaning. The area of focus was the condition of the welds and the base material of a bulk storage tank which was heavily contaminated and left with scaling due to use. GAS B.V's laser tank cleaning resulted in a clean surface and welds, ensuring a much better NDT surface examination could be performed. The team was also able to make a professional problem analysis leading to a sustainable solution proposal for this client.

DRONES FOR NDT

A case study from a prominent southern European refinery sought two options for non-destructive testing utilising the Voliro T. The first step was to measure the thickness of corrosion areas, that had already been visually identified, on their tank. The second step was to conduct a comprehensive inspection in accordance with API code standards. Using Voliro T this saved hundreds in labour hours. There was no need for any scaffolding, which in this case would have required 400 man hours to install and tear down.

there's a huge reduction in both cost and waste, without compromising on quality. Vos states: 'With GAS B.V's laser cleaning technique it is possible to remove specific coatings or scaling, layer by layer, from both ferritic and non-ferritic steels. This is often not possible or very difficult to achieve with the known conventional techniques.'

Plus, any waste that is created is compartmentalised with the right equipment to ensure a safe working environment. 'Innovation and safety is in the DNA of GAS B.V, our goals are to keep developing the laser cleaning technique in order to meet the highest safety demands of our clients and our own VCA (Safety, Health and Environment Checklist Contractors) certification ensuring every employee that works in a potentially hazardous environments can work safely,' says Vos.

LOOKING TO THE FUTURE

The future of technology and innovation within the tank storage industry is bright. With robots for detection and drones for inspection, plus innovations for mapping and cleaning, practically every element of terminal life is now covered. We are now entering a transition period, not only in energy, but moving away from unsafe human work and towards technology replacements. General director Mark Oosterveer at iTanks says: 'We see that the tank storage industry can play a major role in the energy transition for the

storage of energy...Some of our partners work hard on new products and services to enable and support this transition.' The organisation connects companies, institutes and industry experts. Although the global situation is uncertain, it is a great time for innovation!

For more information:

- www.flyability.com
- www.scoutdi.com
- www.voliro.com
- www.exrobotics.global
- www.aeromon.io
- www.nobleo-technology.nl
- www.bakerhughes.com/waygate-technologies
- www.en.robotplusplus.com
- www.aramco.com
- www.aim-gas.com/nl

- 01** Flyability's drone in action
- 02** Scout DI's tethered equipment outside of tank
- 03** ExRobotics ground robot at a terminal
- 04** Nobleo's tank cleaning robot in action
- 05** Waygate Technologies robot
- 06** Robot++'s tank cleaning robot in action

INNOVATING REMOTE SHIP HULL INSPECTIONS WITH DRONES

An increased demand for remote solutions drives game-changing research and development of ScoutDI's Scout 137 Drone System

CAUSED BY, or at least aggravated by, the Covid-19 pandemic, the maritime and offshore world has seen a surge in the need for remote inspection. Fewer hands on deck, increased work pressure and tight work schedules puts seafarer safety at risk and may jeopardise proactive inspection and maintenance work in the maritime industries.

Current maritime and offshore inspection regimes are periodic and, as such, may occur more frequently than strictly necessary. That's for the safety of people, property, and the environment. Better to inspect too soon than too late.

But moving away from manual, periodic inspection regimes to more flexible risk-based processes may have huge advantages. Both inspection crews and asset owners can benefit from increased safety, lower cost, improved efficiency, better data coverage and quality.

To achieve this, robotics is the way to go. Specifically, indoor inspection drones of the flying kind.

INNOVATING WITH ROBOTICS

Drone-based inspections enable safer, more flexible, yet consistent and standardised, inspection processes. It will, in many cases, also improve inspection data quality; a drone can easily record data from areas that might otherwise be hard to reach.

Drones make it easier to get consistent data, recorded from the same distances and lighting conditions. So, the need to send humans into dark, hazardous, confined spaces will be reduced, as will costs related to production stops, logistics and on-site access.

The Remote Drone-based Ship Hull Survey (REDHUS) project is led by DNV, the world's leading classification society and a recognised advisor for the maritime industry. Funded by the Norwegian Research Council, the project is in collaboration with shuttle tanker owner Altera, bulk ship operator Klavness and robotics company ScoutDI.

The overarching goal is to demonstrate a remote ship hull or tank survey process based on automated drone inspection and automated analysis of the video data from the drone.

These are the key technological developments in the project:

- Automated generation and verification of a drone inspection flight plan, based on metrics and simulation.
- Automated execution of drone flight plus new guidelines and data standards for drone inspections.
- Development of ML-based anomaly detection algorithms that can detect corrosion, cracks, coating damage and deformation with a performance comparable to a human inspector.
- A new survey process to maximise benefits from remote data collection and automated analysis.

OPERATING IN A BLACK HOLE

The main goal of ScoutDI in this project is to develop the required autonomy to do the path-following part. The drone must be able to ingest a data file that tells it which exact flight path to follow in a given

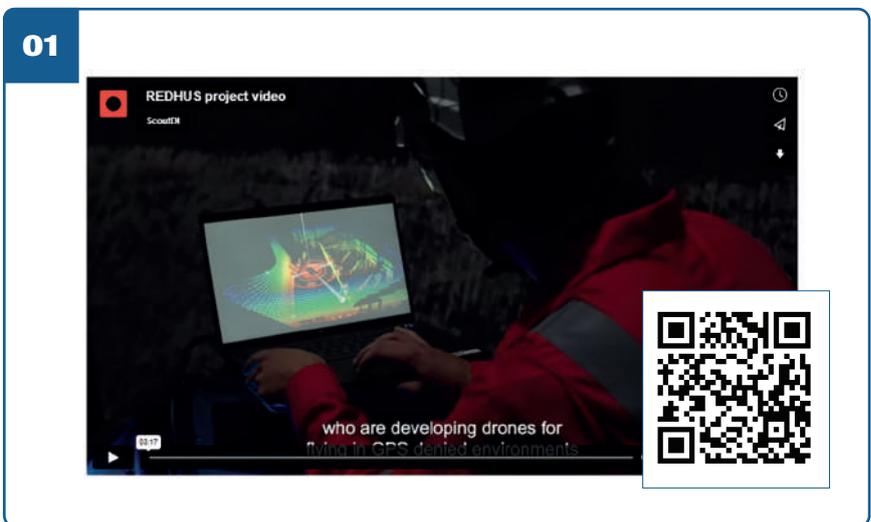
volume and, when launched into the same volume, the drone must be able to follow that path and inspect predetermined points of interest (POIs) along the route. Thus, location and orientation must be as prescribed throughout the entire flight, with relatively high accuracy.

The Scout 137 Drone does a lot of this already, using 3D Lidar technology, two vertical lasers, an IMU and a powerful on-board processor. It can make a local 3D map of the surroundings and knows its own position in it at any time.

But even with a Lidar sensor, the drone cannot know what is around the corner until it has gone around it. At any instant, the Lidar image of the volume you're flying in is based on the present moment – plus some amount of memory. Any unseen feature is temporarily a black hole of nothingness.

The real world is full of volumes where a Lidar cannot see everything from a single position. So the drone must go around those corners and collect data along the entire path to be able to follow it. There are two main strategies:

- Give the drone a pre-made CAD (Computer Aided Design) reference model of the volume



- Allow the drone a mapping flight through the volume and use the resulting data as a map

The CAD model represents a perfect reference and preprogramming a path would allow users to refine the path to be as safe and efficient as possible. This involves some desktop work, but just once. It also makes a lot of sense and is within the scope of the REDHUS project.

The idea of a mapping flight is to gather Lidar data from enough positions inside a volume that it can be combined into a 3D point-cloud map of the entire volume.

This is known as Simultaneous Localisation and Mapping (SLAM). It is the key to autonomy for any aspiring can-do inspection robot.

ONLINE SLAM

Relying on just a mapping flight is a very appealing idea, as it unlocks simplified path-planning in the future. Imagine just flying through a volume once, plotting points A, B, C etc. as POIs and leave the drone to do the rest for all future inspections. You could simply replay the path from the first flight and re-visit the same POIs as marked during that flight. You would get consistent visual data every time, suitable for spotting trends and automated differential analysis later.

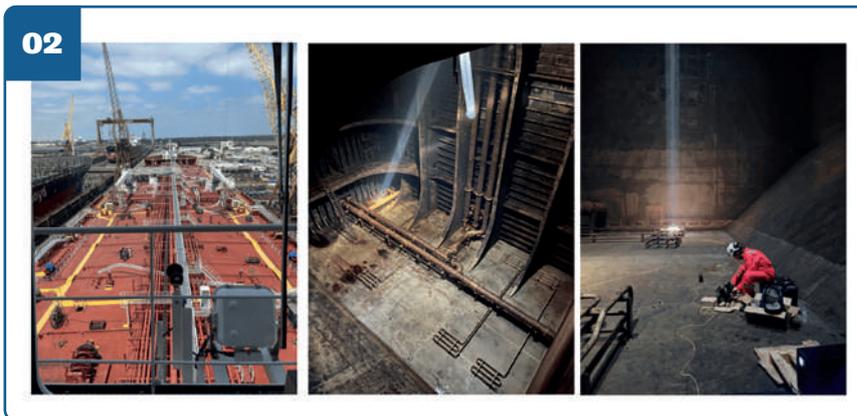
Many SLAM implementations require a very large dataset to be available at compute-time and are very computationally intensive. SLAM for the sake of full, detailed mapping, is often done post-inspection and offered as part of desktop or cloud software. This is called offline SLAM.

The better your online SLAM algorithm becomes, the better the drone's potential to navigate and operate in spaces it has not visited before. Even without the support of a CAD model.

Relying on its SLAM implementation, the drone can, for example, calculate a good path back to the entry point, by itself. Or find the best path between any two points inside any volume. It may continue to refine and extend paths as it proceeds through the volume until it has seen all of it. A pilot may supervise the inspection simply by pointing to locations in a 3D point cloud.

MAKING A MAP THAT FITS THE MAP

In the REDHUS project, the POIs will be defined via a computer interface using the CAD model as reference. Once those points are translated to the drone's online SLAM point cloud, they must match the exact position well enough and there must be free line-of-sight between the drone camera and the POI.



These points are of extra importance to ScoutDI:

- Ascertain alignment of the Lidar point cloud from the Scout 137 Drone with the CAD model, so that the coordinates of POIs on the CAD model correspond to coordinates in the drone's point cloud.
- Prove that the Scout 137 Drone can build a full Lidar point-cloud where all features match the real-life inspection target well enough.
- Prove that when CAD model POIs are translated to the drone's Lidar point cloud, the drone can locate the exact real-world POIs, go to them and point the camera at them.

The SLAM implementation has proved its worth with convincing results in a case study. The vessel, Beothuk Spirit, was moored in a shipyard in Portugal during the case study and testing. ScoutDI has found the drone's built-in localisation able to use a CAD-based map with high real-world accuracy. In context of the REDHUS project, this means that the next step for ScoutDI, is to make the drone actually follow a pre-drawn path between the CAD-based POIs.

THE FUTURE OF REDHUS

The secret sauce of good autonomy is not buried in public domain algorithms or off-the shelf software. There is no magic button or silver bullet. You need

to acquire domain knowledge and continuously refine the technology, taking the intended application into account. It's a time-consuming process that takes lots of people and lots of work – but as demonstrated in REDHUS, it pays off!

ScoutDI is connected to top experts in the industry and academia, such as Professor Kostas Alexis and his team at the NTNU Autonomous Robotics Lab (located near ScoutDI headquarters), who were part of the winning team of the DARPA Subterranean Challenge. This team has contributed with significant improvements to the exploration, location and mapping algorithms.

DNV has achieved measurable progress in automatic defect detection. Their corrosion coating condition algorithm, which you can see in the REDHUS video by scanning the QR code, is now at a level where it is considered to have performance on par with human surveyors. The key takeaway is that a good SLAM algorithm is the key to autonomy, which is ScoutDI's focus for the future.

For more information:

www.scoutdi.com



01 Video explaining REDHUS. Scan the QR to watch in full

02 Photos from Beothuk Spirit, where the case study and SLAM testing took place

03 Typical areas of attention in a ship hull survey

CHOOSING THE RIGHT SURFACE PREPARATION TECHNOLOGY

Bulk liquid storage provider Navigator Terminals recently trialed a new tank floor blasting methodology with C&D Access

▶ SAFETY IS at the heart of everything Navigator does. The company puts the health and wellbeing of its people first, striving to implement the most efficient and environmentally friendly solutions available whilst always reducing the impact of their activities.

To maintain these commitments, Navigator is constantly looking for new technologies and state-of-the-art solutions that can help it support its clients. Research and development are essential to maintain sustainable growth, and to deliver the company's core business strategy of 'diversify, outperform and grow', to align its services in an ever-changing market.

Navigator's core business is bulk storage of a wide variety of products including crude oils, gas, bitumen, chemicals, biofuels, and an expanding range of diversified products. As a tank owner,

Navigator strictly implements an asset management programme following recognised international codes and standards, such as EEMUA 159 and API 653, requiring the tanks to be periodically taken out from service and subject to a thorough inspection, to ensure their continued structural and service integrity.

Maintenance of tank floors, including annular plates, is key for Navigator to prevent leakages that can result in a major environmental concern, and can potentially bring a tank out-of-service earlier than expected, with a significant financial and reputational impact.

MAINTAINING THE TANK FLOOR

Some of the products stored by Navigator are particularly corrosive and a tank floor barrier lining is required to protect

the steel plates. However, to conduct a detailed inspection of the tank floor and annular plates this lining must be removed. Blasting of the plates is not only required to remove a lining but also any build-up of product, rust, or scale, that may have a detrimental effect on the quality of the inspection, thus ensuring that any potential in service defects can be identified.

Abrasive blasting is not just required inside the tank for inspections, it is also necessary prior to the application of a new lining where the correct surface preparation is critical to the reliability and integrity of the lining.

Conventionally, the abrasive blasting of a tank floor is performed by open blasting, creating an extremely hazardous working environment for the personnel involved due to the pressurised air, abrasive particles, dust, poor visibility,



01

and noise, all whilst being carried out in a confined space.

The spent grit used during open blasting operations requires continuous manual removal, which is both a labour intensive and time-consuming process. To offer some perspective, in a 67m diameter floating roof tank with a free height of 1.8m, approximately 100 tonnes of grit are used. This spent grit would then normally be swept, shovelled, bagged, and removed from tank by hand or conveyor. This spent grit then must be disposed of as contaminated waste, with the obvious negative environmental credentials. During both blasting and clearing operations it is essential for operatives to wear respiratory protective equipment, whereas the correct solution is to remove the hazard.

Additionally, as part of the traditional blasting and cleaning processes airborne particles either deposit themselves in inaccessible locations within the tank or remain in the air, usually until the coating process is underway, having a detrimental impact on the lining application.

FINDING A PARTNER

In recent years, aligning with Navigator’s vision for innovation and its commitment to the development of pioneering solutions, the company has continued to work with its supply base to investigate alternative processes to minimise the risks and hazards associated with abrasive blasting, whilst maintaining compliance with the standards and regulations.

As part of this process, one supplier has come to the fore. C&D Access is a UK company with deep experience in the oil and gas industry, based in Newcastle in the northeast of England. Together with C&D Access, Navigator has implemented a new abrasive blasting process, where the abrasive is now contained between the equipment and the floor, reducing airborne dust, noise, eliminating pressurised air lines, and improving visibility. At the same time, the abrasive is recycled, minimising labour-intensive activities, and drastically reducing the waste to landfill.

The blasting is carried out using a floor blasting machine, a compact device that can fit through a standard 600mm diameter manway and that is operated by one person. The abrasive is fed through a funnel, a built-in impeller then propels the abrasive against the surface and a suction hose attached to the unit vacuums the spent grit and blasted material into a dust collector, located outside the tank that filtrates and recycles the abrasive. The abrasive is completely confined between the floor blasting machine and the steel plates with a width varying from 450 to 600mm, a 130m² blasted area can

02	Floor blaster	Open blast
		3384 m ³
	15 days	40 days
	4 tonnes of abrasive	100 tonnes of abrasive
	88 dB	115 dB
	No RPE	RPE required

Maintenance of tank floors, including annular plates, is key for Navigator to prevent leakages that can result in a major environmental concern

easily be achieved in an eight-hour shift, dependant on the surface condition and lining thickness.

By improving the conditions inside the storage tank during the blasting operation, Navigator can allow inspection activities, such as visual and drone inspection, MFL and vacuum box testing to be performed whilst the floor blasting is in progress, significantly reducing asset downtime, improving customer availability, and enhancing its environmental performance.

RESULTS

Navigator and C&D Access have successfully delivered a 67m diameter tank floor (3,536m²) in 15 days, obtaining a total coverage of 95% with the floor blasting machine, using a total of 4 tonnes of abrasive.

When comparing these figures with conventional open blasting, a total of 40 days and 100 tonnes of abrasive would have been required for the same area. This comparison highlights the schedule and environmental benefits; however, the primary benefit is clearly that of safety. Navigator has implemented a much safer working process, eliminating, or minimising the principal hazards and creating a safe working environment for other operatives allowing simultaneous working operations

EMBRACING NEW TECHNOLOGIES

Navigator and C&D Access’s passion for new developments and state-of-the-art solutions have brought in a new philosophy for tank floor inspection. C&D Access have invested heavily in the latest magnetic flux leakage (MFL) technology to maximise floor scanning coverage, allowing the floor and annular plates, including critical zones, to be inspected. All inspection data is collected and analysed, providing an estimated remaining thickness, and evaluating if the floor presents top or underside corrosion. Together with MFL floor scanning, Navigator is using advanced NDT techniques, such as phased array ultrasonics (PAUT) to verify MFL results and carry out inspection of those areas inaccessible to the MFL floor scanner, providing permanent recorded data enhancing repeatability for future inspections.

Navigator is embracing new technologies, obtaining more data, in a smarter way, to assess and manage assets, in a reduced schedule which benefits its clients in a safe and compliant environment. The company is always looking for new ways to do things better.

For more information:

<https://www.navigatorterminals.com/article/case-study-tank-floor-blasting>

- 01 Surface preparation of the tank floor
- 02 Comparison of methods

PREVENTING HUMAN AND ENVIRONMENTAL HARM

Tank Storage Magazine summarises the latest developments in overfill prevention technology

► **DEPENDING ON** the product you're storing, the hazard and/or damage of overfilling a tank can vary drastically. Implementing prevention initiatives costs less than cleaning up a spill and having to repair equipment. When terminal operators come to implement overfill prevention systems and devices, they need to consider the best option for the product being stored. In the case of potentially hazardous chemical or petroleum products, proper overfill prevention is essential.

Despite the rarity of tank overfills, implementing overfill prevention measures tend to be more beneficial in the long run than facing the catastrophic consequences of a spill. A spill can greatly damage a reputation of a storage company and recovering from this can be extremely hard for tank owners/operators. One example of this is Caribbean Petroleum, in Puerto Rico, which was forced out of business following an incident in 2009.

OPERATING PROCEDURES

Tank overfills or errors that occur during the refilling process whilst uncommon, are completely avoidable. When an operator makes sure to install the appropriate tank overfill protection systems they help the rest of industry and society to run smoothly and by preventing hazardous spills. That's on top of protecting their workers and the surrounding environment.

Johan Sandberg, senior business development manager at Emerson, says: 'When tanks store hazardous, flammable, or explosive materials, spills can cause catastrophic consequences. The worst incidents can result in injuries or even fatalities, as well as significant asset damage and extensive environmental harm. The overfilling of tanks has long been a leading cause of serious incidents in the process and bulk liquid storage industries, with a notable example being the Buncefield accident in the UK in 2005, in which 40 people were injured, major property damage was caused, and the cost of settlements exceeded £700 million (€813.6 million). Smaller overfills



too can still generate significant problems for companies in terms of clean-up costs and reputational damage.'

Earl Crochet, SVP of Perceptive Sensors Technologies, and the current chairman of API 2350 says: 'In my over 30 years of dealing with tanks, the reason for most overfills is human error, often caused by inadequate operating procedures.'

Many factors go into determining the proper level to fill a tank. Terminals should consider what kind of tanks and equipment are being used, what products are being stored, how the facility is manned and what procedures are in place. Then, the workers doing the tank filling need to consider speed as well as any abnormal operating conditions.

'Overfill prevention can become more sustainable by the operator training continuously. In addition, we should test and maintain the overflow prevention systems we use according to the manufacturer's rules,' says Omar Ozutku at Milangaz.

Crochet suggests thinking of the five P's of tank operations: 'Philosophy, processes, paraphernalia, people and profit. Each one of these needs to be analysed before an owner can make the best decision for their unique systems.' Understanding how a tank fills and the systems that can help to prevent it from overfilling, are therefore a crucial part of tank management. In training their workforce, an operator equips their

terminal with extra security measures to prevent an overfill from occurring.

Patrick Vieira, leak detection expert at Sensotop, says: 'Our biggest challenge is to report the presence of hydrocarbons from a new leak and ensuring they're not from a previous episode. Our leak mapping strategy allows us to be proactive and support asset integrity managers with an upgrade of their existing system.'

By maintaining a relationship with operators, and undertaking regular checks on overfilled equipment, challenges are easier to tackle. When equipment is maintained, and regularly serviced, there are fewer chances of problems arising that have detrimental consequences.

MITIGATING RISKS

Ozutku says: 'Systems installed for this type of operational safety must work in case of an abnormal condition, so it is wise to choose brands with strong reputations.' Tank facilities need to be able to rely on their solution and be assured that it will protect their workers, equipment, and the environment from hazardous chemicals.

Establishing clear communication between supplier and operator is essential in building trust. That trust contributes to the reliability and reputation of a company and its overfill prevention solution/s. Suppliers that have well-known issues with their products, where spills have still occurred, become less reputable as it indicates their overfill prevention solution has faults.

Ordering product to only fill 90% of the tank, inspecting overfill prevention devices regularly, and paying attention during filling processes are all additional actions that can help reduce the chance of an overfill.

Whilst the overfill prevention market offers solutions that are specific to an operator's needs, a lot of prevention lies in the hands of workers and operators. However, the following solutions represent excellent ways to minimise the chances of an overfill occurring.

AUTOMATIC SHUTOFF DEVICE

These devices work by monitoring the levels of the product during delivery. As the name suggests, the shutoff device will automatically stop the flow of product when it reaches a certain point. This can also be known as a ‘flapper valve’ and is situated in the drop tube in the fill pipe riser.

By cutting off the flow, the valve effectively prevents an overfill and consequently, any product from within the tank spilling out the top of the tank. This allows operators to rely on the valve to prevent damage to their assets, and the environment, and to keep workers safe.

However, that additional security comes with a cost as automatic valves tend to be more expensive than other measures.

FLOAT VALVES

These devices work by slowing the flow of the product when it reaches a certain level. It also prevents vapours from leaving the tank once the product reaches a certain, pre-determined level.

This makes it harder to pour product to displace the vapours. This technology is



also known as a ‘ball float’ or a ‘restriction device’. Risbridger’s new DEAD-STOP valve is designed to open against the flow of product. ‘Once the float sensor has to be actuated, there is zero leakage through the valve,’ says Chris Godfrey, general manager at Risbridger.

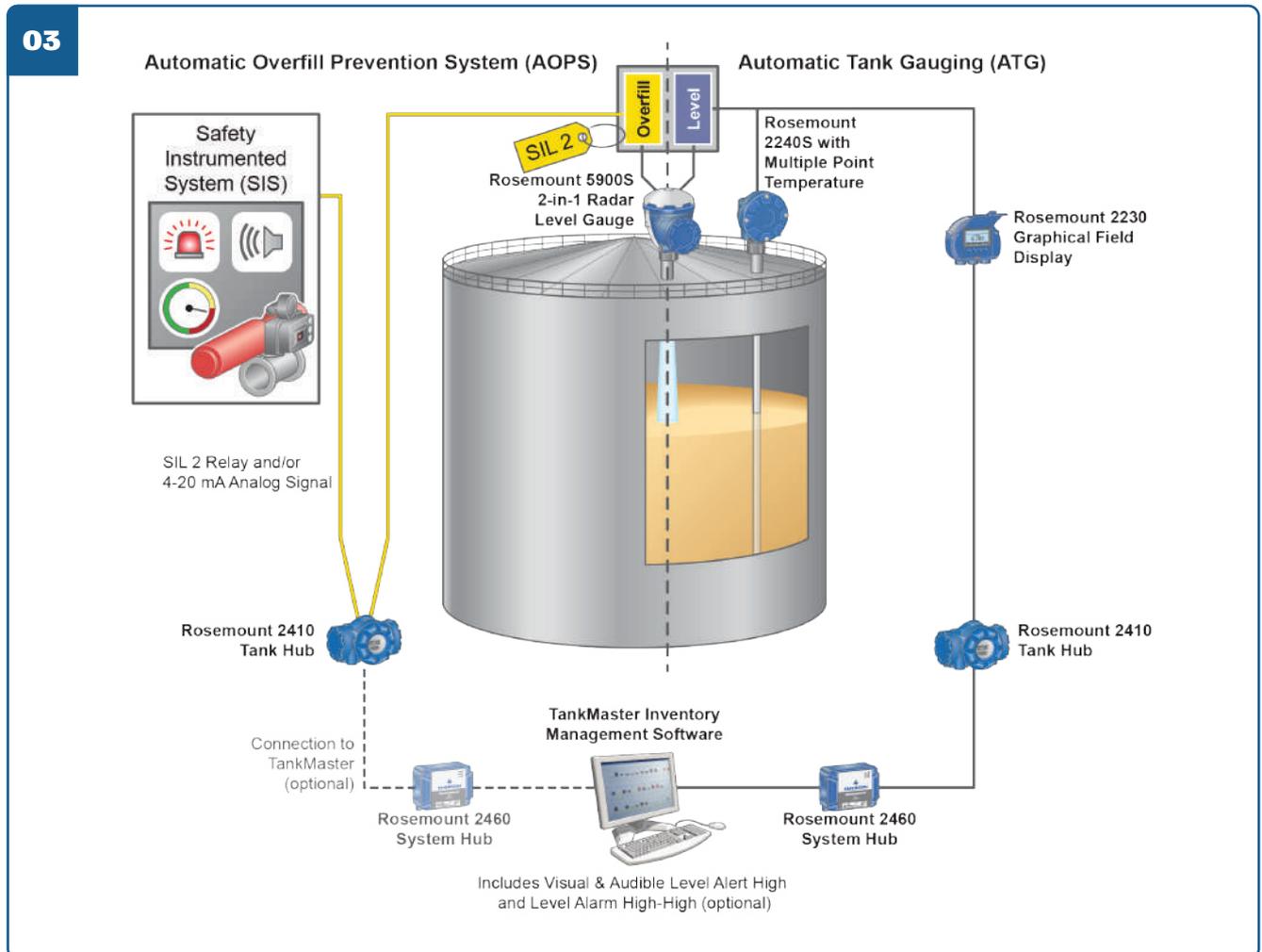
However, for float valves to work reliably, tank roofs need to be secured tightly on top of the tank, and operators need to choose the right size.

TANK ALARMS AND SENSORS

An overfill alarm will go off when the product reaches a certain level in the tank. Once the alarm sounds, it allows enough time for the operator to stop filling and prevent a spill. This is a common prevention device but can sometimes produce false alarms. So, operators may ignore the warning if the sensor has been wrong in the past. Regular testing and maintenance are key to ensuring reliability.

Sensotop detects the presence of hydrocarbons through two technologies to improve and reduce CAPEX. ‘We use low demand detectors based on graphene chemical sensors which alarm when the products touch the sensor and high demand detection with non-contact optical detectors,’ explains Vieira.

Alternatively, Emerson offers level gauges that operate via radar. ‘These devices ensure precise measurements, deliver unsurpassed reliability and



TECHNICAL OVERFILL PREVENTION

are certified SIL 2 and SIL 3. They feature built-in diagnostics to support preventative maintenance and increase safety, and enable partial proof-testing to be performed remotely, thereby saving time and increasing worker safety,' says Sandberg.

THE ENVIRONMENTAL CASE FOR OVERFILL PREVENTION

The environment plays a key part in influencing the devices and systems put in place to prevent overfill. Vieira says: 'Overfilling is defined by a need to optimise storage capacities and constant pressure on the facilities. The risk involved is extremely high due to the volumes involved and the neighbourhood, which can lead to domino effects.'

Sustainability also has an important position in mitigating great impacts on the environment. Ben Adamson at EWFM, says: 'Although we work in industries where promoting sustainability can be very challenging, the majority of our products do promote sustainability in some sense. For example, most of our products can be supplied gas-tight with vapour recovery and overfill protection.'

Responding to the type of product you are filling is central to reducing environmental impacts and increasing sustainability. Ozutku says: 'Consider the human and environmental factors, and whether the chemical is explosive, pollutant or toxic. The limits of the operation must be known, and we must work within them. Otherwise, it can have very bad consequences.'

When an overfill causes a negative environmental impact, the consequences can be greater than they initially seem. 'For example, if a body of water becomes contaminated – as happened with the Elk River chemical spill in the US in 2014 – it can lead to the death of both flora and fauna, and make a freshwater supply unusable,' says Sandberg. 'Even if a spill is contained within a facility, it can still lead

'The future of overfill prevention looks like greater reliance on automation technology to reduce the impact of human errors on the safe operation of terminals.'

to a clean-up operation where soil and other ground material must be removed, safely deposited, and replaced. An overfill that leads to an explosion or fire can destroy the entire tank farm and much of its surroundings.'

PRIORITISING SPILL PREVENTION

Overfill prevention was not always automated. 'Prior to automated overfill prevention systems, administrative systems and operating practices, referred to as manual overfill prevention systems, were utilised,' says Melissa Westbrook, instrumentation and electrical engineering team leader at E2G. 'A key feature of these systems is reliance on the vigilance of the operators to prevent injury and damage to the environment.'

However, as regulations and technology develop, so will solutions to overfills. Vieira says: 'The future is essentially turned towards non-contact optical technologies, requiring little service, to reduce false alarms from existing instruments and provide precise information to the security services.'

The future of overfill prevention is not just limited to creating new technology though. Vieira explains: 'We solved many issues by explaining, training, supplying and repositioning the instruments to considerably reduce the cost of unscheduled revamping and restore the operator's confidence in their safety systems.' By starting with the worker through thorough training,

overfill prevention can be tackled at every angle. With workers and operators understanding the processes of tanks in a plant, what they are being filled with, and the consequences, terminals gain a more informed workforce with faster, more appropriate actions.

'The future of overfill prevention looks like greater reliance on automation technology to reduce the impact of human errors on the safe operation of terminals,' says Westbrook. 'We think this will be achieved by integrating control of product delivery systems, piping networks, and monitoring of storage tank inventories.'

Westbrook continues: 'The future of overfill prevention also looks like asset integrity. Inspecting and maintaining pipelines, rotating equipment, storage tanks, and utility systems as well as control and instrument systems to ensure they function properly and achieve the objective of no overfills, no spills, no loss of containment, and no impacts to safety and the environment.'

For more information:

- www.e2g.com
- www.emerson.com
- www.ewfm.co.uk
- www.milangaz.com
- www.perceptivesensors.com
- www.risbirdger.com
- www.sensotop.com

- 01** EWFM fixed reach top loading arm electrically heated model 2570 TRC
- 02** Sensotop's oil spill detector, Spillcheck
- 03** Emerson's safety loop for automatic shutdown

REGULATORY OBLIGATIONS

Historical events, such as the Buncefield accident in the UK in 2005, have resulted in more rigorous approaches to preventing overfill. 'The main standards covering overfill prevention in storage tanks are IEC 61511 and API 2350. IEC 61511 sets out the best safety practices for implementing a modern OPS (overfill prevention systems) in the process industry, while API 2350 addresses the minimum requirements to comply with modern best practices regarding non-pressurised above-ground large petroleum storage tanks,' says Johan Sandberg, senior business development manager for tank gauging at Emerson.

The API Standard 2350, now in its 5th edition, was established by industry representatives to apply worldwide. The new edition comprises an overfill prevention process, risk assessment, operating parameters, and procedures. Formal, written procedures, good levels of staff training, scheduled maintenance programs and good communication are all key to an API-compliant terminal. Plus, you get the bonus of an optimised workplace with safe practices.

In most facilities, IEC 61511 is the standard and considered best practice. IEC 61511 safeguards terminals and has been adopted by the European standards body, CENELEC. However, IEC 61511 does not cover overfill management systems and non-safety layers, so it is good to apply API 2350 and IEC 61511 in tandem.

HOW IOT CAN REVOLUTIONISE TANK STORAGE

Cyann Fielding explores how the Internet of Things is improving safety and efficiency at terminals across the world



► **THE INTERNET** of Things (IoT) refers to a network of physical objects, known as 'things', which connect and exchange data with other devices and systems over the internet. The Industrial Internet of Things (IIoT) is a branch of IoT where devices are networked together for industrial applications. In the tank storage industry, this allows for data collection, exchange, and analysis between sites and operations, as well as the facilitation of predictive management to improve productivity, cost efficiency and asset maintenance.

Deanna Zhang, founder of etechmonkey and ETM Advisors, says: 'Incorporating more IoT and other types of digitalisation technologies have been a way for the oil and gas industry to optimise operations in the middle of a volatile and sometimes challenging price environment. Implementing IoT also naturally creates more transparency and traceable systems of record, which can help on the ESG side.' Some IoT solutions can also offer greater visibility of the supply chain and logistics. IoT can give a more accurate view of work processes and operations, helping operators make informed business decisions, and understand production floors at the earliest point possible.

'IoT creates critical communication channels between equipment and data repositories, and between the equipment and corporate systems. This all sets the stage for better decisions to be made on the field, more efficient operational execution, increased automation, and better tracking of environmental and operational metrics,' adds Zhang.

IMPROVING EFFICIENCY

'In the oil and gas industry, especially after the pandemic, we have seen a big increase in demand for reviews on inefficiency, reduction of carbon emissions and increasing efficiencies in general,' says Thony Brito, global digital sales manager at Sensia. 'The industry is hiring new talent, new people that want to come and work in an industry with a low carbon footprint to increase operations' profitability and efficiencies that help optimise processes and operations. IoT can help our daily operations run in the oil gas industry and implement workflows that can make the workers' lives easier.'

ISO 9001 is the world's most recognised quality management system (QMS) standard, and many tech companies abide by this. It helps organisations

to implement clear, repeatable processes whilst maintaining a quality of service for their customers. It signals a commitment to continually measure and improve every aspect of operations, while ensuring that the business delivers to a consistently high standard. This helps to increase productivity, win new business, and save money.

By implementing IoT solutions, terminal operators can expect to see improvements in efficiency, productivity and operational expenses. 'Various modules, software and platforms exist to collect essential information that enables real-time monitoring of container levels—which can prevent tank shortages and offer predictive maintenance, like that for the critical sacrificial anodes in a galvanic cathodic protection system for pipelines, to avoid equipment failure,' says Joe Braga from Telit.

IMPROVING SAFETY

IoT solutions can offer a reduction in manual processes. 'Some people might be fearful that digitalisation and IoT can lead to people getting replaced with machines and fewer jobs for people in the future. While it's true that

digitalisation sometimes influences traditional jobs in the industry, the truth is that human operators will be needed for a very long time. Many processes in oil and gas can lead to catastrophic consequences if mishandled or handled without a significant level of care and redundancy, which is one reason why digital transformation has been slow,' says Zhang. 'IoT and these other digital technologies are just more tools in the toolbox for the operator to make better decisions.' The new technology and sensors installed because of adopting IoT solutions, require skilled and trained staff to be able to maintain and manage it.

Braga says: 'By implementing IoT-connected sensors onto equipment, oil and gas companies can collect essential information, which gets compiled and aggregated on a dashboard for managing and monitoring all devices. This data increases visibility, decreasing the need to perform risky manual tasks.' For example, Zenner Gas developed the Mini Level, which uses cellular to read LPG tank levels remotely. In combination with Telit's roaming capabilities, terminal operators can enjoy constant connectivity, ensuring levels are being monitored and preventing disasters.

Connecting to remote devices eliminates the need for a worker to be present on-site to address or investigate a potential fault. John Tillema, CTO and co-founder of TWTG, says: 'With our devices, you don't need to send people to carry out asset inspections, as the device tells you the issue.' TWTG's device alerts an operator when something goes wrong, and so a worker only has to verify and inspect when the alert goes off, saving valuable time and man-hours.

On top of reducing manual processes, it's essential that devices in explosive atmospheres comply with European ATEX standards. Electronics in use in potentially hazardous environments, such as petrochemical and heavy industry, should have ATEX certification to ensure the safety of both workers and the facility as a whole.

'IoT and these other digital technologies are just more tools in the toolbox for the operator to make better decisions'

SECURITY CHALLENGES

Whilst IoT solutions can revolutionise how a terminal operates, it is not without its challenges. Many terminals abide by various regulations and protocols, so need to consider how incorporating IoT measures will impact terminal operations.

Security vulnerabilities are one potential threat when adopting IoT; the manufacturer must ensure their users are secure and there are preventative measures in place when security issues arise. Recent cyberattacks on terminals have highlighted this issue. A hack can hold a terminal to ransom, paralysing operations, wasting money, and damaging a company's reputation.

Kenta Yasukawa, CTO and co-founder, at Soracom, says: 'No system is completely unhackable, but Soracom's cloud-native approach to IoT connectivity and IoT networking makes it very difficult for bad actors to even find devices connected with Soracom. Data traffic is fully encrypted between devices and the last hop (usually a cell tower); from there, data travels directly to the Soracom cloud without traveling over the public internet at all because Soracom owns and manages its network core.'

A well-designed and properly thought-out network is key. 'Customers can choose to create a private peering link to their cloud backend to build a network dedicated for their devices and servers – that is isolated from the public internet. It makes it practically impossible for the attacker to reach their devices and servers,' says Yasukawa.

Operators need to abide by GDPR with their users' data, including when generating insights from data, for devices and processes. This means storing data in an encrypted database. Especially personal and sensitive data. Operators must ensure they're handling data properly. 'Rendering your business in data can be incredibly powerful, but valuable data needs to be protected as carefully as you protect your physical assets. That starts with simple best practices, like not storing credentials on devices. Zero-touch provisioning through the cloud should be a requirement, but we still see a lot of businesses flashing devices with thumb drives,' Yasukawa adds.

BUSINESS CONTINUITY

It's vital that critical infrastructure has good connectivity, as well as a backup plan for when things go wrong. 'Typically, oil and gas extraction occurs in very remote areas that experience extreme fluctuations in temperature, including intense weather phenomena like heat waves and ice storms,' says Braga. 'One of the main challenges of implementing IoT solutions in the gas and oil industry is maintaining a connection with sensors and devices.' If the connection drops and data cannot be shared, it can cause issues across the operation.

It is therefore wise not to rely on a single connection or device for critical operations. Any well-designed network should account for potential failures and have a contingency plan. 'Having a reliable connection is often difficult, due to the isolated nature of these extraction sites and the interference and damage to communications infrastructure caused by harsh weather. Telit overcomes this challenge with our multi-IMSI coverage capabilities, which ensure that our customers have the measurement data they need even under severe conditions,' says Braga.

CONNECTIVITY OPTIONS

The IoT requires internet – and patchy wi-fi is a common thread in all business. However, the impact on critical infrastructure can be disastrous. Soracom's Yasukawa says: 'Customers in the oil and gas industry often use to use multiple network technologies to connect remote devices to their cloud-based backend. Soracom's blended network capability allows customers to pick and choose different connectivity options, e.g. cellular, LPWAN and satellite connections, as needed, just by doing one-time integration from Soracom to their cloud backend.'

'Soracom offers global connectivity designed specifically for IoT use cases. We currently serve customers in the oil and gas industry with LTE, LTE-M and Sigfox connectivity, and recently announced the availability of satellite connectivity in technical preview for even greater coverage in remote areas,' Yasukawa says.

So when implementing an IoT solution, look out for connectivity options. As well as a vast data network, Telit uses Bluetooth a satellite when providing a customised IoT solution. With global coverage and an extensive set of platforms for data orchestration, device and connection management, enabling one-touch access to the customer's global network and business processes.



THE IOT AND FUTURE OF TANK STORAGE

The environmental impact of operations is also something terminal operators must bear in mind daily. With pressure to reduce emissions and implement more sustainable processes, IoT can offer a useful solution.

‘IoT improves sustainability in three main ways: by increasing operational efficiency through better equipment monitoring and faster reaction times to state changes in the system, by better management of potential environmental liabilities through measurement and management of emissions or leaks, and by increasing transparency and resolution of the data that can be collected for environmental purposes,’ says Zhang.

By implementing more IoT solutions, the tank storage sector can establish more efficient processes, maximising the

productivity and safety of their workers. IoT will also help to make workforces more prepared and knowledgeable in the maintenance and control of assets and data handling.

‘IoT solutions enable real-time monitoring and data collection to ensure rigs, trucks, tanks and pipelines function correctly. They offer visibility to catch issues before they become a problem,’ says Braga. ‘IoT system solutions monitor the health and integrity of sacrificial anodes on pipelines and increase productivity, enabling more efficiency and safety for infrastructures and supply chains. These applications inhibit pipeline rusting that can lead to spills and service interruptions. They also reduce the negative environmental impact of a line rust rupture and subsequent spill to achieve corporate social responsibility (CSR) goals.’

‘IoT will provide an open and secure environment for operations,’ says Brito.

‘It will establish an ecosystem, where several partners will be able to connect to containers and to develop containers and applications that can be operationalised within that environment,’ he adds.

Braga says: ‘The industry should embrace IoT solutions because they will lead to breakthroughs in achieving green goals, efficiency and cost savings. IoT can optimise business intelligence to manage the supply chain, reduce staff risks and safeguard against environmental impact. As other industries and our society become more connected via IoT, oil and gas stand to benefit enormously from seamless cross-sector collaboration and data sharing.’

Zhang says: ‘I also see more companies using IoT for achieving ESG metrics or using IoT data to feed corporate emissions numbers.’

IoT offers operators the opportunity to transform how their terminal works, allowing them to accomplish greater milestones and establish a cleaner, more sustainable and safer reputation.

For more information:

- www.etechnmonkey.com
- www.sensiglobal.com
- www.sensyrtech.com
- www.soracom.io
- www.telit.com
- www.twtg.io

01 TWTG’s Neon sensor sends alerts to maintenance engineers, as soon as assets, such as engines, conveyor belts, and pumps start to fail

LEAK DETECTION SOLUTION

As government regulations around greenhouse gasses increases around the world, oil and gas companies are under more pressure to implement solutions to limit fugitive methane emissions across the board. This is done through a variety of different strategic approaches, but perhaps the most important initial step is implementing a solid Leak Detection and Repair (LDAR) plan to understand exactly where leaks are coming from and in what quantity. Tank batteries installed at production sites are often the most common and heinous offenders in this area – thus, monitoring solutions must be specially tuned to help isolate and understand emissions coming from tanks.

However, setting up an efficient air quality monitoring system remained an expensive and time-intensive challenge for one downstream oil and gas company. The client’s core requirement was ease of installation and integration. They needed a system that worked to their specification (per-second data, wireless, ruggedised), that could be set up easily by anyone with minimal training, and that worked out of the box. Sensyrtech developed a customised solution for per-second wireless methane monitoring that could be packaged and set up quickly and scaled to thousands of sites.

The solution involves a few specialised sensing instruments and a central gateway that connects either to the cloud or securely over MQTT/HTTPS to a separate server. All data is visualised in the Sensyrtech cloud application with trend analysis and anomaly detection, and can be tuned to client needs. In this case, Sensyrtech’s IoT solution has enabled the client to keep a close eye on emissions, boosting ESG credentials.

CHOOSING THE RIGHT TANK COVER

Tank Storage Magazine compares the latest roofs & domes on the market

01



► THE ENGINEERING behind each component of a storage tank is meticulously planned to ensure maximum usability for the terminal operator and the workers of a terminal. Tank covers, whether a dome, a roof, or a deck – are no exception. And the style of tank cover will depend on the product being stored.

Riza Altunergil at Aager says: 'There is no single solution for tank roofs. There are different types of roofs, such as conventional steel roofs, external floating roof and dome roof, that are chosen for various parameters.' One of those factors can be the risk of the product being stored.

'Each product has its own chemical characteristics and that causes certain chemical reactions with the roof material. For instance, we recommend stainless steel or special alloys for highly corrosive chemicals,' explains Altunergil.

Jeff Eickhoff, international vice president at HMT, says: 'We strive to partner with our clients to help them select the best technology for each application, considering selection criteria such as safe installation and operation; regulatory requirements; emissions goals; durability and longevity goals; operational requirements; installation considerations;

fire suppression measures; chemical compatibility; capacity; and heel optimisation.'

FLOATING TANK ROOFS

Internal floating roofs (IFRs) are highly popular due to their cost-effectiveness, safety credentials, and efficiency levels. They also help to minimise vapours between the roof and the liquid being stored.

'Product compatibility is critically important for floating roofs, to ensure the integrity of the floating roof over time,' says Eickhoff. 'If the floating roof is constructed from materials that are not compatible with the stored product, it can lead to premature degradation of the floating roof, including failure of buoyancy system and sinking of the floating roof.'

For example, DISCUS Engineered Products offers a solution known as the OpenRaft, a full contact aluminium IFR built to steel specs. So tank owners can get the benefits of aluminium, even if they need a steel roof.

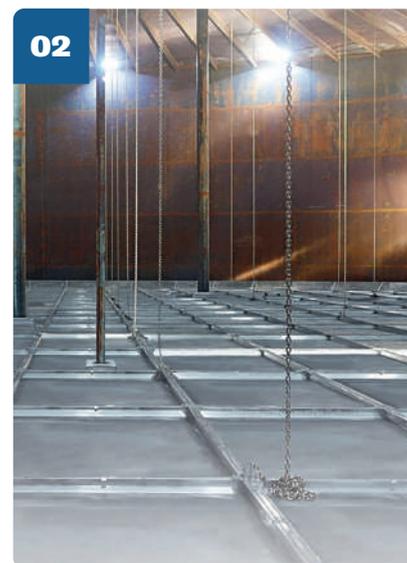
The construction process of an IFR can vary but, broadly, a company will assess your storage needs and come up with a custom design. 'This almost always

involves completion of a product-specific data sheet and can also involve one or more types of surveys, such as verticality and roundness survey or site assessment for dome construction and lifting,' says Eickhoff. This allows revisions and adjustments to be made at the design stage to ensure the best fit.

'We start with a proprietary cribbing/staging system, making the work environment safe to work underneath and on top of the IFR,' says Bill Grimes, at DISCUS. 'The OpenRaft is completely assembled and secured from underneath before workers go on top. The final stage of installation is seam testing, which can be readily achieved from the topside of the IFR.' This means workers aren't placed in perilous conditions at height.

DOMES

Fixed roof storage tanks, or domes, typically consist of a cylindrical steel shell with a dome, or a cone-shaped roof attached to the tank shell. A pressure vacuum valve or breather valve will be installed, which allows the tank to operate at a slight internal pressure or vacuum. These tanks are also fitted with a ring of nozzles that spray foam over the surface of the tanks, in case of a fire.



A structurally supported aluminium dome roof is clear span and does not require a supporting column and a fully triangulated aluminium space truss with the struts joined at points on the surface of the sphere. Mario Strache, CEO at Elson says: 'Aluminium closure panels are firmly attached to the frame members providing watertight sealing using gaskets. The roof is attached to and supported by the tank or concrete wall at mounting points equally spaced around the perimeter of the substructure.'

'The dome protects the stored product from wind, rain, and sunlight. The IFR seals do not experience negative pressure due to wind,' Strache continues. As a result, the dome can reduce nearly all product loss due to evaporation and lowers emissions, as well as reducing the chance of lightning strike-initiated fires. 'The aluminium weighs 1/3 of the carbon steel roof. There is no corrosion, it is installed fast, and no welding is needed,' says Strache.

An arch configuration enables strong, stable structures. This is because the axial forces hold it together in a state

of equilibrium. This also applies to frictionless surfaces. As a result, arch structures require a restraint, either by using heavy side supports or members connection each end of the arch.

A geodesic dome essentially grows from the inside to out, which establishes a safer construction method for workers. By using an arch configuration, tank roof builders can ensure a strong and stable structure. Once the 'rings' are all closed, the dome can then be lifted via grip hoists or a crane to the top of the tank.

'The arch member is subjected to compressive stress under downward loads, such as snow, live, dead load, but the other member connecting the ends of the arch is subjected to tensile stress. This feature of the arch with a tensile member allows it to be a self-supporting structure. This basic principle from the 2D arch is also applied to the 3D dome structure,' says Strache.

PRIORITISING SAFETY

Safety is important when thinking about what roof to use on a tank. One aspect

to consider is how the roof configuration influences whether personnel are required to enter the tank in-service to adjust the roof height. 'With our floating roofs, innovations such as suspension systems allow operators to adjust the IFR position from operating height to maintenance height without putting personnel into a live tank,' says Eickhoff.

The honeycomb design of HMT's Aluminator HFC is designed to minimise welds in contact with the stored product to ensure the integrity of the roof, resulting in a safer removal process when the roof comes out of service.

'Our domes are designed to be assembled from the centre outward, keeping workers at ground level,' continues Eickhoff. This means workers are not put at risk of working at height during construction.

On top of their own best practices, tank roof suppliers and builders should adhere to the API 650 and 653 standards to show they take safety and quality seriously.

'API Standards 650 and 653 are important to establish minimum



acceptable design and maintenance standards, which ultimately prevent catastrophic failures,' says Eickhoff. 'However, they are somewhat limited in their scope of influence. For example, API Standard 650, Annex H, Section H.2.1 describes that purchasers shall consider dozens of factors such as 'both proposed and future product service, operating conditions, maintenance requirements, regulatory compliance, service life expectancy, ambient temperature, maximum design temperature, product vapour pressure, corrosion conditions and other compatibility factors'. But unfortunately, the standard doesn't explain how purchasers should consider these factors, which means that operators are left to their own experience or that of consultants or suppliers.'

Different regions also have specific regulations and expectations. 'Regional regulations and rules are a big factor in choosing the roof type,' says Altunergil. 'For instance, it is mandatory to use internal floating roofs in most of the world due to safety and environmental reasons, however weather conditions, and seismic zones are also other major factors that affect the roof design.'

This is where expertise of a competent roof company comes in. They are key to explaining how terminal operators should consider factors not covered by the standards.

DURABILITY AND SUSTAINABILITY

An operator needs to be able to rely on their tank roof or dome for years, so that the product being stored is not at risk to outside elements or the terminal's assets and workers are not put in direct danger. There's also the risk to the environment, should a tank roof fail.

Grimes says: 'Aluminium IFRs have been around for over 50 years and life expectancy has improved as technology has improved.' Typically, an operator wants an IFR that has a useful service life of minimum 20 years before it needs

RECENTS INSTALLATIONS

The tank roof, dome and deck markets are evolving constantly as standards develop and more sustainable options become available. With increasing concern for operator safety and minimising loss or damage to assets, a clean fuel terminal in the Port of Rotterdam approached HMT for a solution addressing these concerns.

Eickhoff explains: 'Last spring, HMT completed one of the largest dome and floating roof projects in storage tank history, a state-of-the-art clean fuels terminal in the Port of Rotterdam. This project involved the design and installation of floating roofs and domes for 54 tanks. HMT managed the complete installation of the floating roof and dome scope, and the project was completed on time and without any recordable safety incidents'.

And while it's key to follow the rules and regulations set out, Altinergil from Aager explains: 'There can be special cases, too. For instance, we built a special underground bulk tank with carbon steel roof covered with a concrete second layer to protect the tank against terrorist attacks.' This extra layer of risk protection is likely to be project-specific, but in a world that's facing hybrid threats that are both physical and through cyberwarfare, it can be crucial in an at-risk zone.

replacing, so one that can achieve over 30 or more years represents a great investment.

When the appropriate solution is implemented for the product being stored, fewer emissions and loss of product occurs. Strache says: 'The dome protects the stored product from wind, rain and sunlight. It eliminates nearly all product loss due to evaporation and lowers the emissions.' So, product is less likely to escape the tank in the form of a leak, spill, evaporation or vapours.

Using aluminium for your roof or dome can also help operators to become more sustainable. 'Aluminium is a very low corrosive product, that ensures a life expectancy of up to 100 years. It can be 100% recycled and re-used for any other application,' says Strache.

The combination of durability and sustainability can be tricky, but it is an essential balance to make. Tank roof providers and terminal operators should ask important questions, such as: what material is best? How sustainable is it?

Emissions technology is central to a sustainable tank solution. IFRs help to

contain vapours and prevent potentially harmful gases from escaping. Julie Helms of DISCUS says: 'Our mission is to provide the best available emissions control technology and we have set the standard for the lowest achievable emissions rate. As our industry progresses, the environment plays an increasingly key role in operations. Our commitment to emission control technology reflects both a personal desire for clean air, as well as a commitment to improving the planet for the wellbeing of everyone.'

For more information:

- www.aager.de
- www.discusengineeredproducts.us
- www.elsont.com
- www.hmttank.com

- 01** HMT tank roofs at sunrise
- 02** A DISCUS internal floating roof
- 03** Underside of an HMT dome
- 04** Aager tank roof solutions



SHORTCUT TO LOW CARBON AND INCREASED EFFICIENCY

The experts at Owen's Corning explain how heated tank bases can deliver a fast route to cost savings, higher efficiency and reduced emissions

▶ STORAGE TANKS can hold a variety of organic liquids or gases including raw materials, intermediates, final products and usable byproducts. Although mainly used in the oil and gas industry, others, such as the food and fertiliser sectors, often rely on upright storage tanks to temporarily store liquids.

Tanks can vary in design, so the properties of the products being stored determine the storage temperature – and whether additional heating is necessary to maintain it. In the case of heated storage tanks, this often has to do with preserving the quality of the stored product and preventing solidification of the hot liquid.



WHY DOES ENERGY EFFICIENCY MATTER?

The growing worldwide demand for chemical products and proper storage and handling makes energy efficiency of storage tanks a key requirement. This, combined with the all-time high energy prices, forces terminals and processing facilities to rationalise their energy consumption and improve the efficient use of energy sources.

Each year, large amounts of energy are wasted due to a lack of proper insulation systems in place on storage tanks. This used to be negligible, but the current economic environment is demanding facilities to rethink the way energy is wasted.

ENERGY LOSSES IN HEATED STORAGE TANKS

When tanks operate above ambient conditions, the tank walls and roofs are often viewed as the main sources of energy loss. However, while the heat lost at tank walls and roof will fluctuate along with the liquid level, the heat lost through the bottom remains constant.

Depending on the storage temperature and tank size, heat loss through the tank bottom can run up to >250 W/m² (80 BTU/h•ft²) leading to large yearly energy losses that would accumulate to hundreds of thousands of euros over the lifetime of the tank.

WHAT ABOUT CARBON EMISSIONS?

Globally, heat accounts for nearly half of energy-related carbon emissions. Therefore, losing large amounts of heat leads to high, unnecessary, carbon emissions for your facility. In times when processing facilities and terminals are focusing on reducing their overall carbon footprint, it is crucial to fully grasp every opportunity to reduce heat losses and corresponding emissions.

TACKLING THE EMISSIONS ISSUE

Insulating the tank base can immediately reduce the heat loss through the bottom up to 90%. One of the easiest and most cost-effective ways to immediately tackle this is to install a cellular glass insulation system underneath your heated storage tank.

The insulation value of cellular glass insulation does not change during its lifespan, which helps to ensure constant and lasting energy savings. This allows for easy calculation of the yearly energy savings, payback periods, annual financial yields and, saved emissions over the lifetime of the tank.

CALCULATED PAYBACK PERIODS AND ANNUAL YIELDS

Tank builders and terminal owners can call on the expertise of Owens Corning's technical services team to assist with the calculation of payback periods and annual yields of the investment in a Foamglas HLB insulation tank base insulation system.

These calculations consider all relevant factors such as temperatures and local energy prices. For each project, the heat lost through the base without insulation is calculated and compared with the total investment cost. This provides the total payback period of the investment in a Foamglas tank base insulation system, which can be as short as merely months depending on the storage temperature of the contained liquid.

In addition, the total future yield of the investment is calculated for the active life of the tank with an insulated tank base. This shows the amount of energy saved per area of insulated tank base, and the total yield per year after the payback period.

WHAT ABOUT MY EXISTING TANKS?

Dedicated tank base insulation systems can easily be installed during scheduled tank maintenance programs, when the tank is emptied to inspect the metal tank bottom and possible metallurgic repairs are being done. This can be done by lifting the tank and positioning it on jacks, allowing the insulation system to be installed onto the concrete deck before the tank is lowered again.

Another way is to install the insulation directly onto the metal base inside the tank and weld a new metal bottom onto the newly installed insulation system.

For more information:

www.foamglas.com

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WHAT'S ON AT STOCEXPO

StocExpo is back in March 2023, but what new features does the leading event have to offer to exhibitors and attendees, alike?



01

> THE LARGEST and longest running international tank storage and future fuels event will be taking place in Rotterdam on 14-16 March 2023 to inspire, connect and share knowledge within the tank storage community. 'The opportunity to immerse yourself with noteworthy people and companies is our main priority. In doing this, StocExpo connects key decision-makers now, to connect the industry to a bright and prosperous future,' says Rikki Bhachu, StocExpo's head of marketing.

This year's StocExpo come with a brand new look, and plenty of exclusive features that set the exhibition and conference apart. 'Highlights will include an incredible exhibition and conference, the StocExpo Forty Under 40, Women in Tanks and the Global Tank Storage Awards. The last StocExpo was an incredible success, and we can't wait to bring everyone back together again,' Bhachu says.

NEW BRANDING

With a brand new look for 2023, StocExpo is embracing the future of the tank storage industry. 'The new branding feels fresh and different from before,' says Bhachu. 'Previous years graphics have promoted dated parts of our industry, but as we move into more sustainable future fuels, the new branding design has a much more obvious nod to that future.'

Stepping away from last year's oil slick, the fresh colour palette and minimalist iconography is a signal that StocExpo is modernising along with the oil and gas industry. 'The new graphics and colours encompass the storage of ammonia, hydrogen, biofuels, the capture of carbon, and robotics. The new branding stands out, works on all formats and links back to bulk liquids,

robotics, drones, and e-fuels. It also reflects current challenges and future developments in terminal safety, efficiency, and sustainability,' says Bhachu. As the sector becomes more focused on the energy transition and fuels of the future, StocExpo is proudly leading the charge.

ASSET MANAGEMENT CONFERENCE

Brand new for 2023, we have launched a new conference track entirely dedicated to asset management and integrity. This will be free to attend and will be targeted at the HSE managers and asset managers who attend the event.

Topics covered include: lessons learnt from incidents; sharing HSE best practices; improving behavioural safety at the terminal; preventing cyberattacks against critical infrastructure and; managing the transition to fluorine-free foams. The conference will be chaired by VDMA, which represent 3,500 German and European engineering companies.

COLLABORATION WITH FETSA

'For 2023, we are focusing on inspiring, connecting and sharing knowledge across the bulk liquid storage community. Thought leaders from around the world will be gathering – alongside exhibitors and visitors – to discuss the future of the industry,' says Bhachu. The Federation of European Tank Storage Associations (FETSA), and *Tank Storage Magazine* have formed a partnership to produce the 2023 FETSA Tank Storage Conference.

The industry will come together to discuss the future of tank storage including the geopolitical, energy and

digital transitions as well as resilience in the face of a changing world. You can read FETSA's executive director, Ravi Bhatiani's latest analysis on page 45.

TERMINAL TOUR

For the first time at StocExpo, you have access to an exclusive Terminal Tour. On the morning of 14 March, Koole Tankstorage Botlek (KTB) will be hosting a terminal tour at its current and future fuels terminal in the heart of the Port of Rotterdam. KTB is one of the most advanced and complex terminals in Europe, and you can read all about it in our interview with terminal manager, Michiel Flier, in the next issue of *Tank Storage Magazine*.

SUSTAINABILITY TRAIL

With multiple terminals looking for technology to help build tanks to store future fuels, we have created the Sustainability Trail. Companies offering solutions for ammonia, biofuels, hydrogen or other future fuels, or helping terminals to reach net zero emissions will be highlighted in a trail, in the Event Guide and on the StocExpo website.

ROBOTICS PLAYGROUND

New this year, StocExpo will have a designated area on the exhibition floor for robotics companies to showcase their latest technologies and innovations. This is your chance to get hands-on with the latest robotics technology in inspection, cleaning, efficiency, and maintenance.

For more information:

Scan the QR code to register now or visit www.stocexpo.com



MEET THE EXHIBITORS

BlackWolf

BLACKWOLF

Stand C24

BlackWolf offers world-class analysis services for your 3D LiDAR data. The company's proprietary system uses automated intelligence to automatically register, classify, analyse and inspect all required elements of the storage tank. It's even got API/EMUA code built in. Structural analysis reports can be turned around in just two business days, and the system is used on over 1,000 tanks, so you can have confidence in the results.

BlackWolf also offers highly accurate calibration and strapping tables for 3D scanned storage tanks. BlackWolf's secondary containment analysis easily determines if a your berm/dike meets the requirements for secondary containment, with a simple pass/fail indication and a solution if it fails.

BlackWolf has years of experience converting LiDAR data into Solid 3D Models for use in CAD programs for use in asset management, engineering, or planning analysis of digital twins to give clients the answers they need.

For more information:

www.blackwolfindspection.com

Owen's Corning Foamglas Insulation

OWEN'S CORNING FOAMGLAS INSULATION

Stand I25

The bottom of a tank is one of the most critical locations for heat transfer and energy loss. The consequences of not having a dedicated tank base insulation system are energy losses that lead to increased costs and emissions.

A dedicated Foamglas insulation tank base system will limit heat transfer through the tank bottom to help make sure the tank is operating at maximum efficiency. The insulation performance of Foamglas insulation remains constant through its lifespan, offering permanent and steady energy cost and emission savings. The payback period can vary from several months to just a few years.

For more information:

www.foamglas.com

HyBird

HYBIRD

Stand D3

HyBird is showcasing its Clarity Asset Reality Management System (ARMS), the smartest and most intuitive SaaS solution for the operation and maintenance of oil and gas terminals.

Making use of the most advanced digital technologies including the digital twin, computer vision, artificial intelligence, virtual reality, and cybersecure cloud computing, Clarity transforms asset operations and maintenance.

Clarity is built on four pillars:

- **3DRM:** a high-fidelity photorealistic 3D model of the entire facility delivering centimetre-level detail.
- **Smart PI&D:** linking the PI&D to the 3DRM providing valuable instantaneous context for every component.
- **Workflow integration with 3DRM:** Clarity integrates CMMS and EAM capabilities. All workflows are tagged to the 3DRM allowing perfect contextualisation of the work.
- **The connected workforce:** the augmented reality Clarity mobile app allows automatic on-site tagging of assets data and work procedures even in GPS denied environment.

Clarity provides benefits in business continuity, knowledge management, and remote cooperation. It can save clients €500k+ per year and delivers seven times ROI within a year of deployment. Visit stand D3, where HyBird will demonstrate how Clarity can transform terminal operational efficiency & profitability.

For more information:

www.hybirdtech.com

Hytrans Systems

HYTRANS SYSTEMS

Stand G20

Hytrans Systems presents its latest innovative technology: the Floating Oil Recovery Unit (FORU). The FORU is a skimmer, based on the latest technological developments, with a down-draft system that performs skimming activities. Its shape makes it free-floating, becoming one with the waves

and prepared to function under rough circumstances.

Hytrans Systems manufactures, and supplies mobile water transport systems with hydraulically driven submersible pumps (HydroSub). The system is designed for use during large-scale incidents where deployment must be done in no time using minimum manpower.

For more information:

www.hytrans.com

InnoVfoam

INNOVFOAM

Stand E11

InnoVfoam is dedicated to the design and supply of foam extinguishing systems and fire monitors, working with distributors globally and with location in the Netherlands, Germany and Denmark.

InnoVfoam is an all-round partner for end users, contractors and advisors in the petrochemical, offshore, aviation, logistics, shipping and waste recycling sectors.

InnoVfoam has its own line of products: foam concentrate, foam makers, foam admixture and fire monitors. InnoVfoam also has its own demonstration facilities, a service department for carrying out maintenance on every type of foam admixture system and a laboratory for carrying out quality analyses. When it comes to fire safety and extinguishing solutions, reliability is essential, which is why InnoVfoam works exclusively with internationally proven partners.

For more information:

www.innovfoam.nl

iSensPro

ISENSPRO

Stand A5

iSensPro will present its newest, ATEX-certified sensor in a small test set-up to demonstrate the non-intrusiveness and easy installation of the device. Visit stand A5 at StocExpo for a sneak peek into the power of its data analysis to detect anomalies along the lifecycle stages toward corrosion of insulated assets. iSensPro will provide an overview of the

information it generates for maintenance management, so attendees will gain a better idea of its unique value proposition.

For more information:

www.isenspro.com

Lightning Eliminators & Consultants, Inc.

LIGHTNING ELIMINATORS & CONSULTANTS, INC.

Stand B3

LEC specialises in solving lightning-related problems and eliminating lightning-related risks. Its largest customer base is the petroleum industry, with most of its customers operating in the petroleum, chemical and electric power industries. LEC designs, manufactures, and installs products that will improve a facility's reliability and safety.

Visit stand B3 to see the Retractable Grounding Assembly (RGA). This bonding device is made for floating roof storage tanks. Installing RGA's on floating roof tanks will greatly reduce their risk of ignition from a direct or nearby lightning strike. The RGA creates a positive electrical bond across the seal between the floating roof and shell, thus limiting any arcing which may occur between the two surfaces. Over 14,000 RGAs are currently in service worldwide.

For more information:

www.lightningprotection.com

Protego

PROTEGO

Stand L25

The Protego Valve can guarantee zero emissions at tank operating pressure, due to its extreme tightness. The highly developed manufacturing technology of Protego Valves means that tank pressure is maintained up to set pressure with a tightness that is far superior to the conventional standard. So, product loss is minimised and emissions reduced.

According to the Protego Standard PS-001 leak rates are measured at 90% of the set pressure. This testing ensures Protego valves exceed the most stringent leakage rate requirements of EPA, API2000 and EN ISO 28300.

Customers know they can rely on Protego's research capabilities, engineering expertise and high-quality products for the up and downstream

oil and gas, petroleum, chemical, pharmaceutical and bio-energy industries.

For more information:

www.protego.com

Reynold's Training Services

REYNOLD'S TRAINING SERVICES

Stand D27

Showcasing its state-of-the-art, fully emulated tank farm and process operations environment, Reynolds Training Services is an industry-leading training and competency assessment provider working within high-hazard industries. This allows face-to-face courses to be delivered in a real-life simulated environment.

Reynolds Training Services is accredited by leading awarding bodies including NEBOSH, IOSH, QualSafe and GQA delivering accredited and bespoke programmes (training, competence assessment and management) for a range of clients across the industry, as well as developing bespoke courses and materials. REynolds has also developed its online competence management system, CALMcloud.

Come and visit Reynolds Training Service's stand at StocExpo 2023 where it will be demonstrating its Honeywell BPCS system at its 'real life' training facilities.

For more information:

www.reynoldstraining.com

Scully Signal Company

SCULLY SIGNAL COMPANY

Stand F7

Visit Scully at StocExpo 2023 to see the new Intellitrol2 communication between truck and terminal for improved safety and operating efficiency.

Intellitrol2 features extended tank truck data download from the truck to the TAS system, new extended remote connection capabilities between the terminal and Intellitrol2, is compliant to the new EN13922 revision, has bypass sensor recognition, functional Safety – SIL 2 and an active dead man option.

Scully's systems include oil delivery, overfill prevention, retained product monitoring, vehicle grounding and

verification, and vehicle-to-terminal communications.

Scully serves its global customers from the headquarters in Wilmington, Massachusetts, USA, along with offices in the United Kingdom, Belgium, and India. Scully is represented in over 60 countries and is ISO 9001 Certified.

For more information:

www.scully.com

Sherwin-Williams

SHERWIN-WILLIAMS

Stand M7

Sherwin-Williams has been at the front of the linings market for more than 30 years, with a proven track record and significant testing/certification to back this up. They were amongst the first lining suppliers to offer fast return-to-service linings and superior inspection capabilities with their OptiCheck technology.

With the significant changes in the market (bio and renewable sourced fuels etc.) Sherwin-Williams has maintained its focus in this area, with a range of products (with Nova-Plate 360 leading the way) to meet the changing demands while maintaining its legacy of superior products, coupled with highly experienced technical experts.

Sherwin-Williams is also investing heavily in the testing and developing high-performance linings in their new state-of-the-art Centre of Excellence in the USA and at development hubs in Germany.

For more information:

www.sherwin-williams.com

STB

STB

Stand J29

Specialising in seal technology, STB will be showcasing some of its seals and systems that include component and cartridge seals, seals according to API 682, 4th edition, and mechanical seal support systems.

STB prides itself on transparency and flexibility as well as quick lead times. At STB, everything is made in-house, from the design to the manufacturing. Visit stand J29 to see STB's German craftsmanship and engineering first hand.

For more information:

www.stb-dichtungen.de

A DIGITAL WORKER REVOLUTIONISING THE WORKPLACE

Tank Storage Magazine sat down with Marvin Lehel from Siemens, to discuss the company's innovative solution that picked up a Tank Storage Award



> THE TANK Storage Award for Innovative Technology recognises solutions that are revolutionising the tank terminal industry. As an IT tool, Siemens' Digital Worker enables terminals to operate more safely and efficiently – reducing the time in the field of a human worker. The Digital Worker is compatible with a multitude of devices and requires no qualifications, making it easy to use and access for operators. By identifying assets and providing immediate contextual information, like possible damages, how to fix them, and instructions for action, the Digital Worker replaces manual processes of investigation. This helps to make processes more efficient and thorough. It also increases safety provisions for manual workers, as they will be alerted of a fault and can deal with it quickly and appropriately. This process was recognised by the Tank Storage Award judges as a 'very useful solution which will allow greater insights for terminal operators.'

Winning the award allows Siemens to celebrate the team's hard work that led

to this innovative technology, which could change terminal operations in the future. 'The award ceremony was only the second time our team was all together, so for us, it was an internal get-together. The award was the cherry on top we had been waiting for. In combination with StocExpo and the conference, it was a great time which everybody deserved, following Covid,' comments Lehel.

INCREASING SAFETY AND EFFICIENCY

As digitalisation becomes increasingly important and prominent in the bulk storage industry, so too has predictive management which brings better safety provisions and efficiency for manual workers.

Siemens' Digital Worker merges the virtual world with the physical world, according to Lehel. The Digital Worker is an open system software solution for digitising workflows in tank terminals, replacing pen and paper processes and establishing easy access to

information. 'The Digital Worker is about making industry data usable for everyone in the field,' says Lehel. 'Before it, there was a struggle; with a lot of different information existing and it not being accessible when you needed it. The Digital Worker is about getting the right data efficiently, and to the right target audience.'

The accessibility of information allows all teams in a terminal to understand the condition of their assets and provides solutions saving time, money and avoiding risks. The Digital Worker can provide the necessary work instructions, checklists, repair instructions, and more, following the inspection of terminal assets.

Siemens introduced the Digital Worker to increase flexibility for terminal operators, using digital processes to aid worker efficiency. 'It takes plant operation to the next level,' says Lehel. 'We have several case studies in the chemical industry, and the oil and gas industry, where our customers are focusing on this technology. This is coming into the tank terminal industry.'

IDENTIFYING WHAT TERMINALS REQUIRE

Terminals previously used pen and paper to keep track of asset maintenance and understand what needed to be done to keep them in good operational condition. The problem with manual processes like this is a higher possibility of mistakes when collating the data. Plus, it's slow. Siemens discovered that a digital process could replace the analogue, where operators could have access to predictive maintenance and real-time documentation of their terminal.

Hence, Siemens established the Digital Worker to improve efficiency, data quality and synchronisation between industrial partners. This revolutionary process was recognised through the Innovative Technology award – 'it will change the way terminals operate in the future,' commented judges, adding that it will become a crucial tool for the interconnection of terminals.

'This technology is open to working with all equipment suppliers which are on the market,' says Lehel. So, implementing the Digital Worker is not dependent on the equipment a terminal has in place.

CARRYING OUT MAINTENANCE

One example of the Digital Worker in use is a leading specialty chemicals company based in Cologne, Germany, named Lanxess. Regular checks and maintenance are essential for the smooth and safe running of the company's plants. Lanxess found the Digital Worker helps to limit complexity. For Lanxess, the Digital Worker digitises workflows and process plans, enabling technicians to carry out operations

efficiently and safely. Siemens' software replaces the lengthy process manual workers carry out, creating digital lists themselves on their PC.

Lanxess is currently equipping field personnel with tablets in a pilot scheme where workers fill out checklists that are linked to the company's central maintenance and enterprise resource planning systems. Once a worker has completed a checklist, it is automatically sent to the respective engineering departments and archived – an essential step in improving legal security. For Lanxess, this process is seamless, fast, and transparent.

In addition, using GPS, the Digital Worker can track tools, equipment, and people within any facility. This element of the software proves crucial in case of an injury or accident, as it can direct workers to the location or right equipment and result in identifying faulty assets immediately.

THE FUTURE OF THE DIGITAL WORKER

For Siemens, the future possibilities for the Digital Worker seem endless: 'We make augmented reality useable in the field. Making it accessible in the field to

all workers, and therefore it is important to constantly and continuously think about the worker who will carry out tasks,' comments Lehel.

'We at Siemens can produce a huge portfolio of software and hardware and, for us, it's really important to push dedicated, comprehensive, solutions to our terminal customers,' says Lehel. 'It is about thinking about partnerships between terminal operators, terminal builders, between the whole eco-system, to fulfil the needs of the future.'

Siemens hopes that the Digital Worker will further enhance safety in the future. The Digital Worker could check whether a worker is wearing the right protective clothing when entering different areas of a facility and connect workers to remote experts, who can assist field workers from anywhere; on-site, at home, or another plant. In addition to these safety measures, the Digital Worker's future boasts more streamlined processes for terminals, reducing waste, enhancing safety and achieving efficiency.

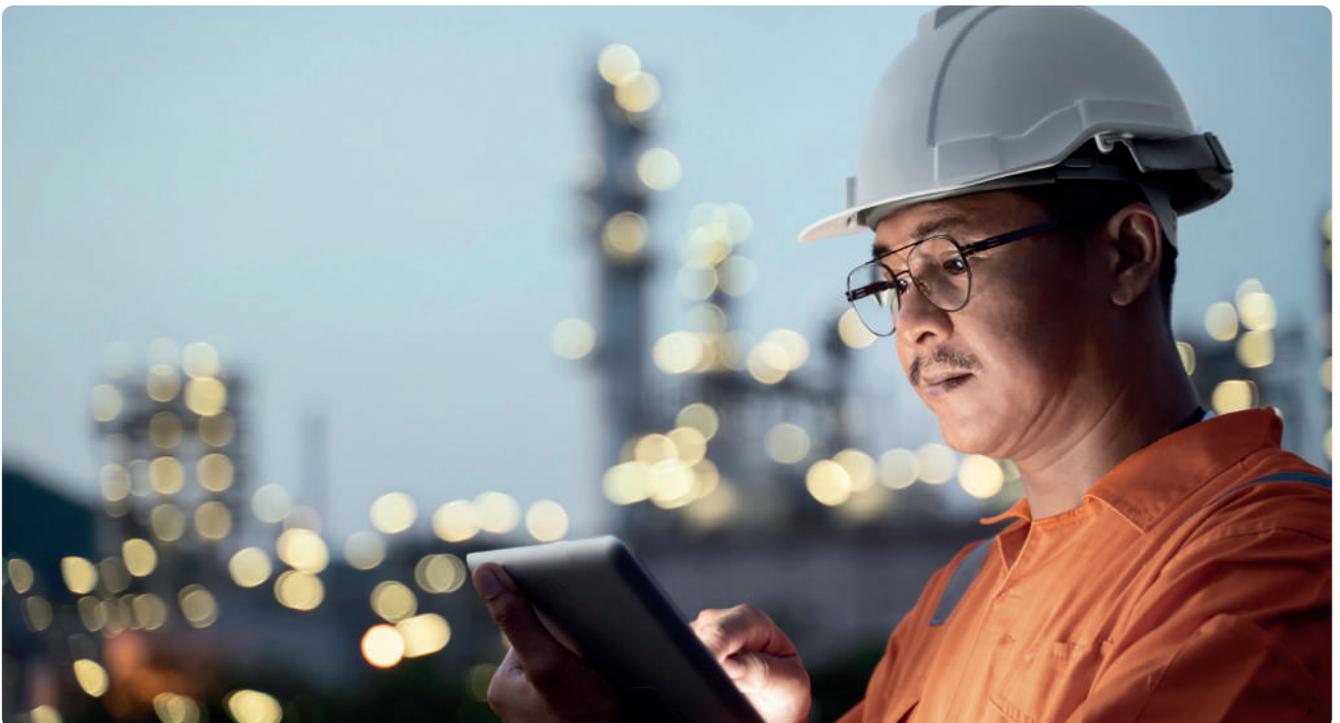
'The transition has just started from the analogue to the digital worker, but it will be a key element of the future of the terminal,' says Lehel.

For more information:

www.new.siemens.com

<http://siemens.com/tank-terminal>

The transition has just started from the analogue to the digital worker, but it will be a key element of the future of the terminal



TOTAL SOLUTION DIGITAL CARE

CEO of Falcker, Thomas Schouten, tells *Tank Storage Magazine* about their digital asset care platform and what makes it award winning



01

FALCKER'S digital care asset platform was crowned the winner of the gold Terminal Optimisation award at the 2022 Tank Storage Awards. Falcker's digital platform reduces the time required for inspections and displays early warning signs of tank failures, among other functions. The judges felt the solution offering such a level of increased efficiency deserved to have Falcker recognised

as a key player in the optimisation and improvement of the industry.

'Winning the award was great because it was a true acknowledgement of the market we are in now. We have currently been around for six years and to win that award in your fifth was a really big recognition for all of us,' says Falcker CEO, Thomas Schouten. 'It means that we're not just another innovative company, we are really embedded in the terminal process and appreciated by our customers.'

The Terminal Optimisation award goes to the software, service, or model that succeeds in optimising, streamlining, or improving a storage terminal and Falcker's solution hit those criteria. Schouten describes their digital asset care platform as the 'total solution' for storage terminals. 'Our platform is used for inspections, but it is also collaboration tool. It can be used for maintenance projects, regulations and third-party software which, in turn, allows the whole of the asset care to be managed in one place.'

A MILE AHEAD

'I think we are a specialist operating in a niche,' says Schouten. Falcker began

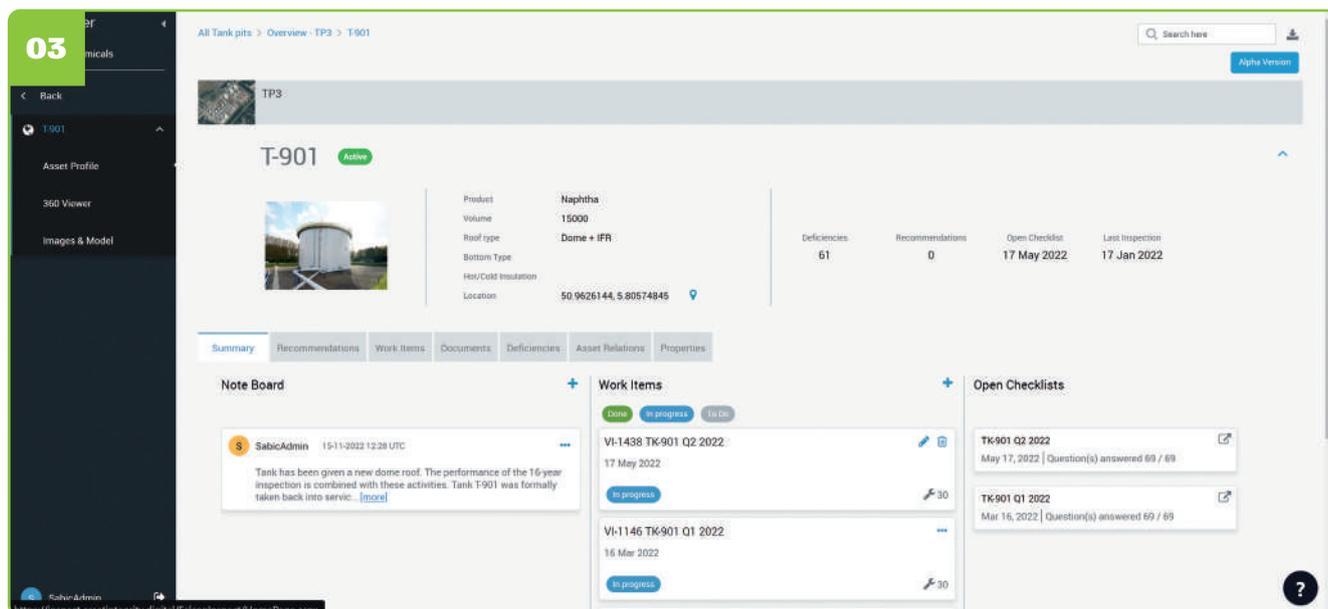
in 2017 on the Maasvlakte Olie Terminal (MOT) in Rotterdam, Netherlands. This is part of a joint venture with Vopak, Shell, Saudi Aramco, BP, ExxonMobil, and TotalEnergies. Together with these partners' maintenance engineers, Falcker designed and developed their award-winning platform. 'We worked in a creative way, involving experts and specialists from those companies who have actually been working in this business their whole lives.'

Falcker also worked with the relevant authorities to ensure their platform ticks every box for their customers – including legislative and regulatory processes. Customers also have the ability to customise the platform to facilitate specific inspection needs.

Even though Covid was a difficult time, Schouten believes the pandemic helped Falcker gain a head start in their industry. 'We already had customers at that time. All the pilot projects that we had were stopped due to Covid which, on one side was a pity because we worked hard to get those pilots. But, on the other hand, our competition had the same problem – and they didn't already have projects and clients in the pipeline.' This left Falcker's competitors a few steps behind.



02



AGEING ASSETS

Falcker operates within the tank terminal business, petrochemical and energy (oil and gas) with their customers including industry giants BP and Vopak. Schouten says the biggest issue he sees terminals facing are ageing assets. He explains: 'With the energy transition coming, the investment in storage and piping facilities is under pressure. A new energy is on its way and terminal operators will need the infrastructure to support this.'

Companies want to extend the life of their assets for as long as they can but this requires more and better-quality monitoring. However, there is a lack of specialised personnel to carry this out.

To solve this, Falcker now offers remote inspections. 'Instead of going in the field and doing the inspections ourselves, we can now just sit behind the screen and do them remotely,' explains Schouten. Although, there will be a small percentage of things that cannot be done through the screen, these now become much quicker to carry out as other inspections can be done remotely. This makes the process much more efficient.

Schouten explains that Falcker's digital solution is focused on getting the highest possible return on investment for their clients in a safer and more efficient way. 'When people get older, they need to take better care of their bodies. So, as your assets get older, you need to take better care of them. Better asset care means that you also have less chance of spills, incidents, failures or damage. It's a very important piece of the puzzle.'

A DIGITAL FUTURE

Even though the industry is moving towards digitalisation, there will always

be the need for humans. 'Our role is facilitating and improving human work to make it more efficient and safer,' says Schouten. 'Digitalisation and automation are just ensuring that the asset care that's needed is provided. I think the difference is that we are doing it the digital way instead of with pen and paper.'

Falcker has now begun the process of digitalising its own processes, not only the platform. For example, drone boxes have been placed at sites to automate data collection, 'Now there is no need for any more pilots on site. We put drone boxes on site and from there, we execute pre-programmed flights,' says Schouten.

He adds: 'We are digitising more and more and more. In the future, non-destructive testing (NDT), ultrasonic thickness measurements (UT) and all kinds of data can be imported onto the platform. This can be used to create fit-for-purpose and remaining lifetime calculations.' For those companies who want to use this data for their ageing assets, this will be a great addition to the monitoring solutions.

ENERGY TRANSITION

Schouten describes the energy transition as 'an exciting time for us all'. While the new energy will come with challenges for critical infrastructure, Schouten suggests that proper monitoring and asset inspection can aid the transition. 'I think we need to realise that the infrastructure that is here now can be monitored and could be used for new energies.'

Using hydrogen as an example, he elaborates: 'Although some modifications may be needed, large tanks and pipeline assemblies are exactly what hydrogen needs to be effectively stored and transported. This means that many of the

existing practices we have surrounding assets, including maintenance, inspection, and management will remain largely unaffected by the energy transition.' The assets are not going anywhere, so need to be sustained.

'We are looking for new energy and older companies that want to take their infrastructure into to new energy solutions, like old world and a new world combined,' says Schouten. Winning a Tank Storage Award proves that Falcker is on the right track and their solution is poised to streamline terminal processes. It's a great moment, not only for digitalisation, but for the future of the industry.

For more information:

www.falcker.com

- 01 Thomas Schouten, CEO of Falcker
- 02 The team at Falcker
- 03 Falcker's digital asset care platform



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Convened by the Energy Institute's sector experts, International Energy Week 2023 is the global conference focused on transitioning out of the geopolitical and environmental crises facing energy.

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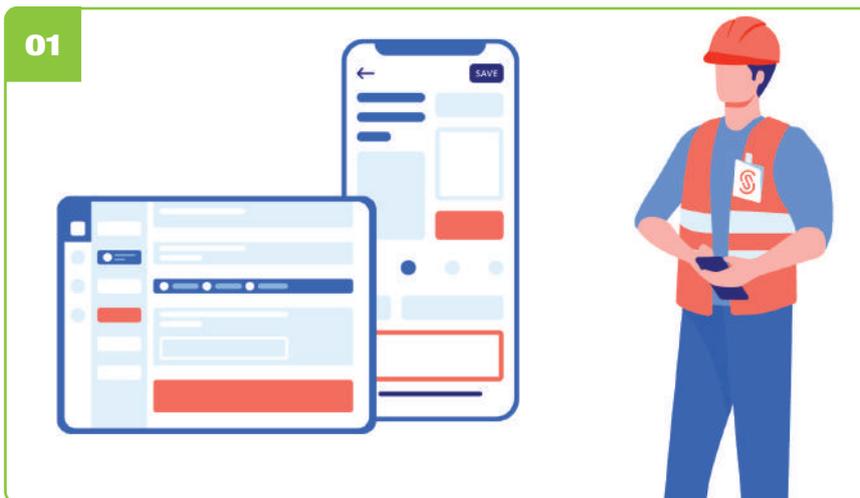


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BRINGING THE DIGITAL TO TANK STORAGE

Cyann Fielding sat down with Stefana Sopco, head of content marketing at Smartflow, to discuss what winning the silver Terminal Optimisation Tank Storage Award means for the future of their solution

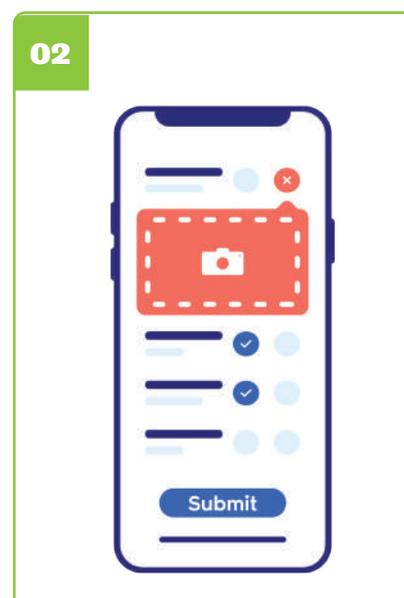


> FOUNDED IN 2011. Smartflow holds digital innovation at its core. The software application is used to model, prepare, execute and analyse inspection checklists in the tank storage sector. Inspectors in the field use Smartflow's mobile app to efficiently execute workflows and capture data that is shared with internal and external stakeholders in real-time and via advanced reporting. Joining the tank storage industry in 2018, this relatively new player picked up the silver Tank Storage Award for Terminal Optimisation.

The win hasn't curbed Smartflow's innovation. Stefana Sopco, head of content marketing at Smartflow, says: 'We are continually developing out-of-the-box solutions such as the digital ISGOTT solution (International Safety Guide for Tankers and Terminals). With our digital ISGOTT solution, terminals and ports can digitalise the ship pre-arrival checks for the terminal, the ship/shore checklists, the summary of repetitive checks, and many more. Terminals use our platform and app to standardise their loading and discharging operations, ensuring the smooth arrival of LNG and reducing ship/shore documentation while focusing on the ultimate goal of safety and environmental protection.'

Smartflow aims to change dynamics in field operations by offering a solution that

helps energy businesses accelerate the execution and compliance of inspections and checklists. In optimising business processes, Smartflow helps to implement increased efficiency and logistics, ensure safety, and reduce the frequency of downtime events. Business leaders can maximise operational productivity, so operators can focus on maximising other areas of growth.



As a digital platform, Smartflow views itself as an accelerator in the journey towards digitalisation. When Smartflow moved into the tank storage sector, the company set out to provide a solution that helps customers feel comfortable in the technology transition. Smartflow works collaboratively to deliver qualitative services, tailored solutions to specific industry needs, and cutting-edge technology, whilst connecting workers across the organisation.

WINNING THE AWARD

Smartflow hoped to win an award to gain support and show the industry that it is fully established as a digital platform that optimises terminal efficiency. The team knew their solution incorporated elements that the industry looks to implement at terminals. Having now won the silver award for Terminal Optimisation, Smartflow has set an example with a digital solution that can replace outdated and potentially risky manual processes.

'Smartflow is thrilled to have the recognition, and it has been great in terms of exposure because we have seen terminals from all around the world come to us,' says Sopco. 'Companies share their pains with us and explain how they have managed processes previously. Often they discuss what they envisage, and Smartflow will start working from there to provide a solution for what they need. The award has been a great opening for us worldwide in doing this for companies.'

PUTTING THE WORKER FIRST

When entering the tank storage sector, one of the things that stood out for Smartflow was how the sector values passion, trust and people. These values were reflected in talks with tank storage, and energy and petrochemical companies in how they wanted to build their platforms.

Over the course of the last four years, Smartflow has learned that the root of all processes, products, and services in the tank storage sector is the field worker. The most important thing for companies approaching Smartflow is the challenges

EVENTS AWARD WINNER

and needs of their field worker. Smartflow understands these worries and optimises processes, starting with the field workers' needs, then the terminal's.

Each company has a different idea of how they'd want to work. Smartflow's product can adapt to each vision. Experts who have dedicated their time to learning about the tank storage industry and immersed themselves in its operations have helped Smartflow understand that companies do not need another tool. Rather, they need something that helps them facilitate processes.

Terminals often need to adapt to volatile situations and change processes quickly. Smartflow bridges the gap between people and technology. By supporting terminals in streamlining processes, Smartflow helps to implement a solution that uses specific frameworks that enable terminals to benefit from standardised processes.

At StocExpo, Smartflow spoke to multiple terminal operators. These conversations taught the team to start thinking from a framework perspective. Each terminal is different and therefore they needed to approach each terminal's assets, processes, and technology differently from one another to a certain extent.

Sopco says: 'It is important to be flexible in the tank storage industry and StocExpo showed exactly this.' By introducing a customisable software, terminals and their operators are able to adapt it to their specific needs. Whether that is completing checklists more efficiently, or compiling data for future research.

BRINGING TECH TO OIL AND GAS

Smartflow has pushed its digitalisation solution into the tank storage industry, identifying that the sector needed support in this area. There are multiple

factors to consider when implementing new technology. Will it reduce lengthy processes? Will it increase safety? Will it make processes simpler? Smartflow identified the confusion caused by slow processes previously in place and understood this needed to be changed.

The oil and gas industry can have some complex risks and compliances, but Smartflow saw this as a good challenge. And the company have clearly taken advantage of this. Having learned so much about the industry, winning the Tank Storage Award has given Smartflow the opportunity to help lead the industry to digital processes.

COLLABORATION

With Smartflow, a leading tank storage provider has digitalised the ISGOTT 6 procedures, using the platform's versatility to include the various stakeholders in the process digitally. The client has always been focused on digitalising the handshakes between various parties such as terminals, vessels, agencies, carrier shipping companies, and the authorities. The introduction of ISGOTT 6 provided a well-grounded reason to accelerate this.

The entire ISGOTT process involves Parts 1 to 9, divided into pre-arrival, arrival, and repetitive checks performed by the loading master at the terminal and the ship's captain at the tanker. There are multiple challenges with this process, whereby ISGOTT activities involve maintaining and printing piles of checklists. Manual filing of this kind takes time and labour. The client was consequently experiencing a reduction in efficiency and a higher risk of miscommunication. Hence, the client wanted to implement an easy-to-use, cost-effective solution to overcome these challenges.

This is where Smartflow came in. Smartflow provided the client with a fully digitalised ISGOTT process, connecting the loading master, ship captain, operations team, logistics department, and the client's back-end system. The digital solution enables the client to capture, track and keep records safely stored in the cloud to help designated workers access them at any point, reassuring terminals that they are fully compliant with governmental regulations, and that they will not misplace files. Smartflow's solution helps the client to save time, manpower and avoid fines or even more severe consequences for being non-compliant.

The system was implemented in July 2021, co-developed with the client to suit the terminal's specific needs and gradually improved based on client feedback. Smartflow standardised the client's loading and discharging operations, which ensured the smooth arrival of tankers at the Europoort terminal in Rotterdam, Netherlands, as well as other terminals from Asia and the USA. In addition, this reduced ship/shore documentation while focusing on the most crucial goal of safety and environmental protection.

Following the implementation of Smartflow, the time taken by the loading master to fill in the ISGOTT checklist was reduced from 45 minutes to just 10. Moreover, no human contact is required whilst performing these tasks, increasing safety at the tanker and the terminal, particularly during the Covid pandemic. In delivering a contactless solution, a customisable platform, and easy integration, Smartflow can increase results and reduce risks for the client.

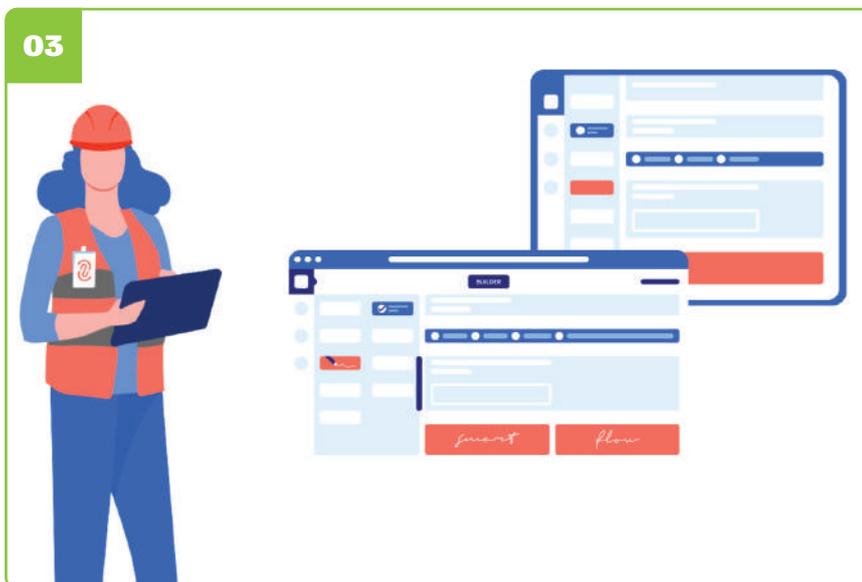
THE FUTURE FOR SMARTFLOW

'We pride ourselves on being rewarded by such a prestigious industry jury,' says Sopco. 'This award has opened doors and established trust in our solution for storage terminals across the globe. It has motivated us to bring more developments to our solution to even better match the needs of the industry. The award has boosted our commitment to the product.'

The future is bright for Smartflow and the digitalisation of the tank storage industry. In developing solutions, Smartflow moves forward in implementing better solutions for terminals and workers alike.

For more information:

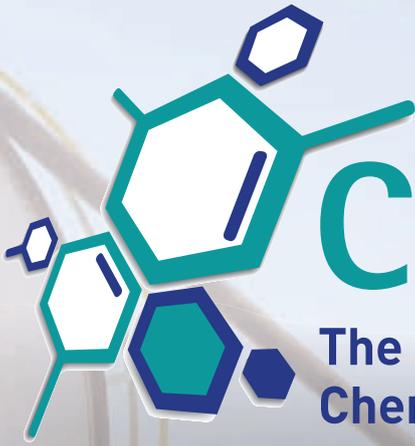
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BECOMING CYBER RESILIENT

Industry experts discuss cybersecurity for critical infrastructure and why your terminal needs a solid plan at the latest Tank Talk

> IN NOVEMBER, *Tank Storage Magazine* hosted our last FREE

Tank Talk webinar on cybersecurity and critical infrastructure. Hosted by our editor, Anamika Talwaria, the webinar brought together cybersecurity industry leaders Holger Berens, chairman of the board of German Federal Association for critical infrastructure protection (BSKI), Igor van Gemert, CEO and founder of ResilientShield and Rene Gijbsbers, managing advisor at R2E Group.

In 2022, there have already been several attacks on tank terminals, on countries themselves, including Denmark and Germany, and the direct impact of those attacks is on society. Governments are now pushing for more organisations to get their cybersecurity in order as there is now an increased risk.

Cyberattacks are now the number one global risk according to PwC, who estimates the damage from cyberattacks alone next year will be \$8 trillion (€7.7 trillion), equating to \$250,000 (€243,000) per second.

HOLISTIC APPROACH

First to present, was Holger Berens. He began by explaining that it's not just about cyber. We are living in a hybrid world. Terminals are open to physical attacks from the air, such as drones, or via sea, such as the recent Nordstream pipeline incident. Ultimately, companies need a holistic approach to security to keep critical infrastructure safe.

WHAT'S NEW WITH REGULATION?

NIS2 is being introduced, which will ensure companies are implementing adequate risk management following a baseline of basic security elements.

To emphasise how things are going to be changing, Berens crunched the numbers. Today, in the current scope of regulations, there are just 1,800 identified critical infrastructures. However, when NIS2 comes into place, 60,000 organisations and companies will fall within the scope of the new law. All of these will have to implement measures for security. In Germany, those companies and organisations who do not comply will be sanctioned and fined.

Berens says this gives managers a new opportunity to present a business

case to COOs and CEOs for a budget to implement these security systems – unless they wish to be fined.

IMPORTANCE OF BCM

NIS2 will require organisations to implement specific policies for their networks and IT systems, including incident management, business continuity management (BCM), crisis management, supply chain security, test and audit and cryptography.

Cyber and physical risks can be merged when writing policies; organisations do not need to create different guidelines for both. These are hybrid threats that require hybrid guidelines. By creating an integrated management system against all threats, terminal operators will be covered under the framework of compliance management.

Berens explained the BCM is for reaction when there is no time for prevention. This is to prevent hesitation. When something goes wrong, organisation's have a plan to fix it and go back into a normal way of working as quickly as possible. The BCM is not based on the organisations assets but on the critical processes and how quickly an incident can be fixed.

Organisations will have a responsibility to maintain and implement security measures. It is no longer a choice but an obligation under the new laws.

THE WEAK LINK

Passing over to Igor van Gemert and Rene Gijbsbers, the pair opened their part of the webinar by explaining why cyber resilience is a necessity.

Gijbsbers explained how storage terminals are a potential weak link in the value chain which can have direct impact on other industries. When a storage terminal is attacked it has an impact on traders, refiners and transportation. This then impacts wholesale marketing, manufacturing and even fuel stations.

So, why storage terminals? Due to the rapid digitalisation of the sector, storage tank terminals have become an easier target for cyberattacks; especially if the rollout has been rushed, without proper security in place.

If your terminal systems link to third party ones, you're left open to potential

attacks. Organisations need to ensure their systems are extremely difficult for hackers to infiltrate.

Ensuring cyber resilience is in order is highly important. Insurance companies will not insure you if your cybersecurity is not up to a certain standard. Van Gemert stressed that insurance policies are not enough to cover you from threats.

BECOMING CYBER RESILIENT

Becoming cyber resilient starts at the top. Van Gemert explained how we need to be asking the right questions to management teams. Do we fully understand the potential financial and organisational implications of a cyberattack? Who has the power to shut down operations? Is management aware of emerging legislation that could increase potential personal liability? Employees must have education on the effects of a cyberattack. He lists four key points to remember:

1. Identify critical assets
2. Assess business vulnerabilities
3. Manage risk
4. Mitigate threats

An organisation can get visibility of their current risk exposure by performing an assessment. This will allow them to see how protected they are and how they can make improvements.

The webinar ended with insightful questions from our participants that were answered live by the speakers.

We will be back with another Tank Talk in the new year, focusing on the future of tank storage and the energy transition.

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Our team got very hands-on this week!

A huge thank you to Oikos Storage Limited and Arunan Sriskanda for taking the TSM team around their storage terminal on Canvey Island. It was a very educational visit and good fun, too!

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