



ABS
& AFFILIATED COMPANIES



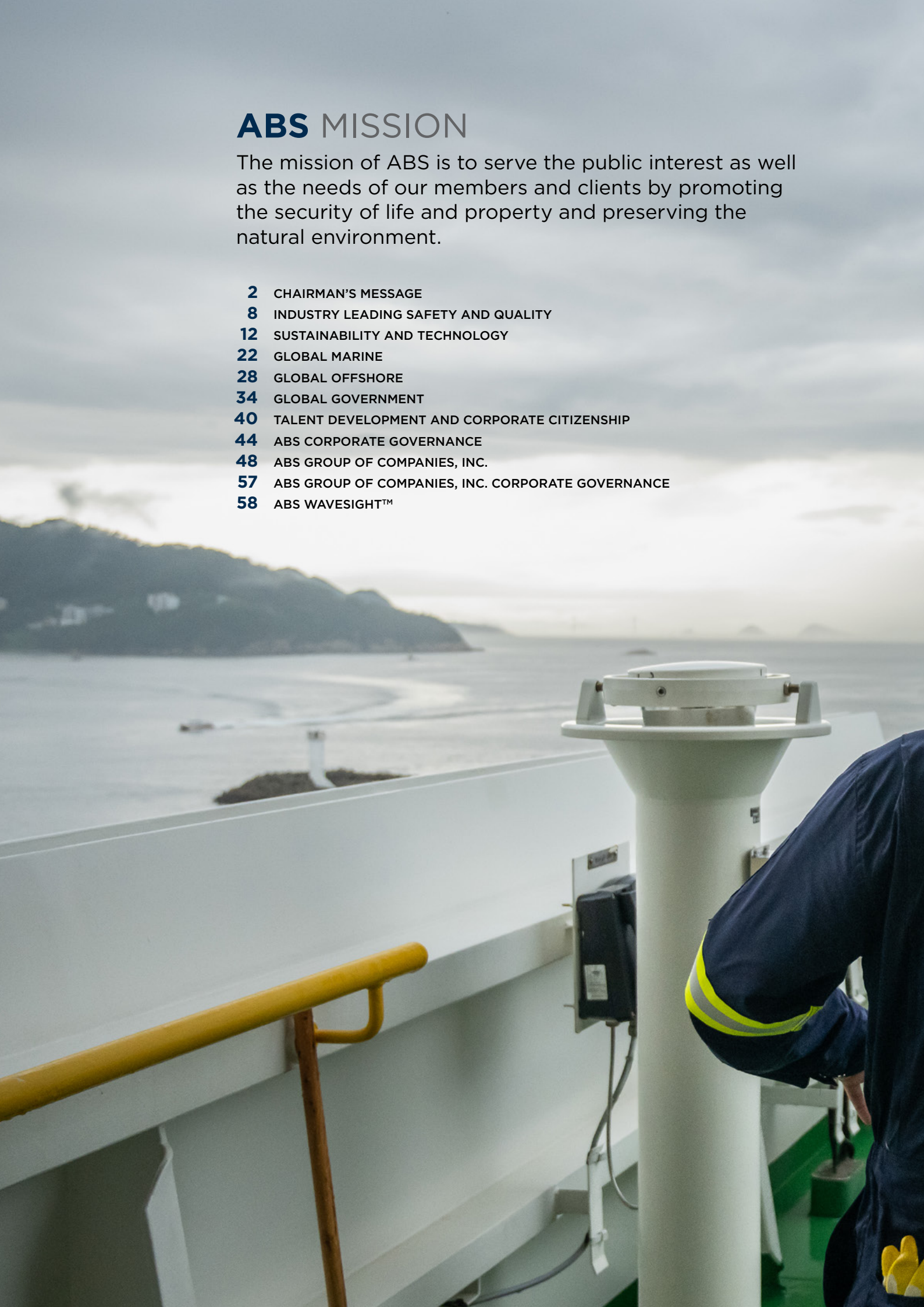
SAFETY LEADERSHIP
FOR A
CHANGING WORLD

2023
ANNUAL REVIEW

ABS MISSION

The mission of ABS is to serve the public interest as well as the needs of our members and clients by promoting the security of life and property and preserving the natural environment.

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CHAIRMAN'S MESSAGE

SAFETY LEADERSHIP FOR A CHANGING WORLD

At ABS, we believe there's a direct correlation between safety and performance and 2023 will be remembered as a year when our safety centric and mission driven strategy, our north star, guided our industry-leading performance.

2023 will also be remembered as the year our industry began its transition to a multidimensional world, where fuels, technology and data unite to provide the hybrid solutions required to achieve net zero.

So, our attention now must turn to new boundary conditions of safety, availability and scalability of fuels and infrastructure. We should also acknowledge the importance of new relationships: government to government, government to industry, owners to charterers and ships to ports, which will be key to success in this dynamic new normal.

This is a sweet spot for ABS. We operate in the space between safety, regulations and technology, which is precisely where the action is taking place in the global energy transition.

2023 saw ABS further cement its industry leadership with new research clearly demonstrating we can get to net zero by 2050. However, while technically possible, the goal is kinetically challenging. To illustrate the steepness of the gradient of the curve in front of us, we need to understand the calculus to get us to net zero by 2050. We will need 70 percent zero-carbon e-fuels, which requires 10 times more renewable energy than is currently produced, and 30 percent carbon-neutral fuels, which will require 100 times more carbon capture than we have today.

And in these challenging times, ABS again excelled, delivering another year of strong growth and solid performance in all areas.

The ABS-classed fleet grew to 289 million gross tons in 2023, and ABS further strengthened its number one position in global orderbook share at 24.2 percent, holding leading positions with both shipowners and



shipbuilders. Among shipbuilders, ABS remained number one for orderbook share in Brazil, China, Singapore, South Korea and the United States (U.S.), and with shipowners, ABS is number one for orderbook share in Brazil, Denmark, Hong Kong, Singapore and Taiwan. ABS is also number one for existing fleet share in Brazil, Denmark, Greece, Hong Kong, Singapore and the U.S. We have also maintained our leadership across the entire global offshore market.

Last year, in the global marine sector, we continued to lead in classed tonnage of the existing fleet for tankers. We also led the orderbook share for tankers and gas carriers and maintained strong orderbook positions for containerships and bulk carriers. In addition, we extended our lead in sustainability and digital services and expanded our U.S. government footprint.

Most importantly, while maintaining market leadership, we continued to lead the industry in safety. In 2023, ABS achieved the industry's lowest lost-time injury rate by far. Our hull and machinery casualties were again the lowest by far of all our competitors, as they have been for 15 years running, and we maintained our global leadership and the number one position in all three major Port State Control regions. At the same time, we helped industry address numerous technology and safety issues arising from the decarbonization journey and cope with the technical and commercial demands of an expanding regulatory landscape.

We are focused on the development and enhancement of our class services and are investing in our world-class engineering and survey teams. We are building our decarbonization and digital capabilities around



excellence in class while harnessing the power of artificial intelligence to help our clients and members make sense of vast and intricate data sets to deal with the ever-growing complexity of the industry. Across the ABS enterprise, our guiding principle in providing safety leadership for a changing world is that every step forward in technology must be accompanied by a step forward in safety. Last year, as in every year, ABS kept this focus and led the way for the industry's continued safe innovation.

Of course, virtually all the advances occurring in sustainability and decarbonization depend on digital technologies for their operation and ultimate success, particularly in the way of analytical and control capabilities. This means that cyber risk will evolve with the same speed and scope as technology, and there is no room for pause in cyber defense development.

ABS was the first classification society to identify cyber risk in the maritime and offshore industries and promote cyber safety initiatives for them, and we continued this leadership last year through a number of projects aimed at cyber resilience for smart yards, smart vessels, autonomous and remote-control systems, augmented and virtual reality environments, and the wearable technology that is emerging for survey, inspection, maintenance and operations.

One striking aspect of the drive to decarbonization is the resurgence of nuclear power as a viable zero-carbon alternative marine fuel. ABS is playing a leading role in helping government and industry shape the future of advanced nuclear technology in the maritime domain, including key research with the U.S. Department of Energy and multiple new technology qualification and approval in principle projects with industry, and last year, produced groundbreaking studies on the use of nuclear power in containerships and tankers.





In the offshore sector, we have maintained and built on our global leadership by anticipating the demands of a rapidly evolving industry and positioning ourselves to be ready to meet its needs. This includes new developments in the blue economy, where, recognizing the increase in global demand for offshore spacecraft launch and recovery, ABS published the world's first international requirements for the safe design and construction of offshore spaceports.

The ABS value proposition is derived from the three different parts of our business – with Bureau's core classification services, the ABS Group of Companies, Inc.'s (ABS Group) risk and consulting services and ABS Wavesight's maritime software as a service (SaaS) working together to deliver enhanced value for our clients.

In 2023, ABS Group divested its former Technical, Inspection and Verification (TIV) business allowing ABS Group to focus its market strategy on providing continued and enhanced support to critical infrastructure for key industries around the world including oil, gas and chemical, power and energy, industrial manufacturing, government, and marine and offshore.

ABS Wavesight continued to pioneer advanced digital services and released extensive enhancements to its fleet management software, Nautical Systems, that will unlock deep efficiencies in core fleet operations. At the same time, ABS Wavesight signed partnership agreements with leading players across satellite communications, risk management, smart electronic fuel monitoring, fleet procurement and maritime cybersecurity.

SAFETY LEADERSHIP FOR A CHANGING WORLD

We live in technology-centric times and work in technology-centric industries, but it must never be forgotten that people will be the heroes of the global energy transition because technology has no sense of humor, intuition or common sense.

This returns us to another important truth: the maritime and offshore industries are, at their core, people industries. That is why ABS has devoted an enormous amount of time and resources to education and training efforts and to the establishment of industry-leading centers of excellence around the world where industry, academia and regulators can join forces to shape a future that is as safe as it is technologically advanced.

I can look back with pride and satisfaction on ABS' many achievements over the past year due to two groups of people who have always supported our organization: one is the clients who place their trust in us; and the other is the employees who make up our global staff, whose cumulative efforts resulted in all our achievements because, as a group, they are truly second to none in their knowledge, expertise and dedication to the safety of life, property and the natural environment at sea.



ABS is guided by the SPIRIT of ABS, a set of values that shapes everything we do. These values are rooted in Safety, People, Integrity, Reliability, Innovation and Teamwork – all underpinned by our steadfast commitment to quality in everything we do. Our performance in 2023 demonstrates how that SPIRIT is alive and well at ABS and underscores once again how success is a team sport.

As we look down the road toward an industry utterly transformed, ABS' long history of safety leadership means we can be confident that however rapid the pace of change, ABS will ensure safer operations remain the foundation of sustainable progress.

Chris

Christopher J. Wiernicki
Chairman and CEO of ABS
Chairman of ABS' Affiliated Companies



INDUSTRY LEADING SAFETY AND QUALITY

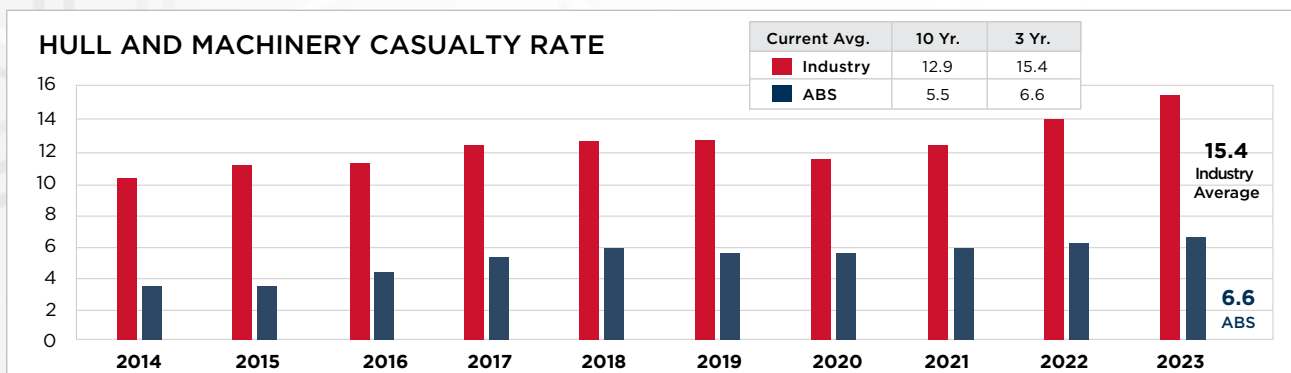
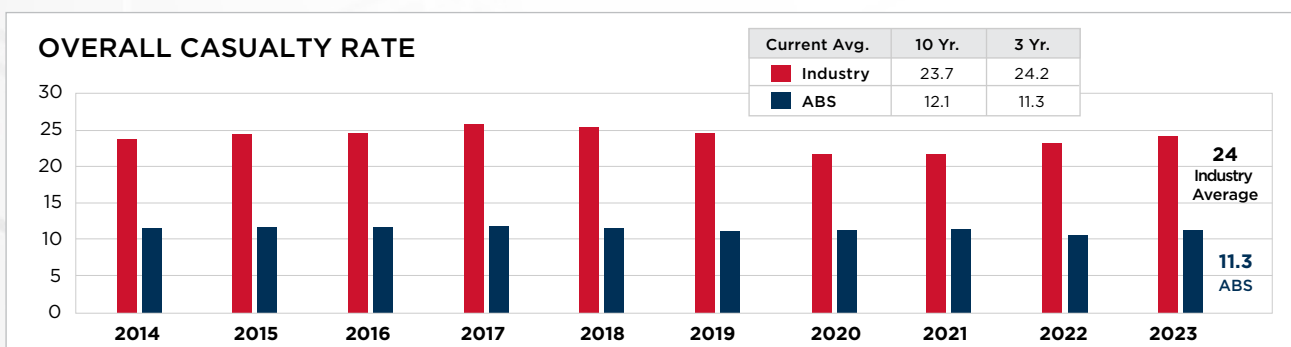
SAFETY LEADERSHIP

Safety is the foundation of everything ABS does and is an endless pursuit. For ABS, safety is a core value. The organization has built its reputation as an industry leader in maritime safety underpinned by a commitment to continual improvement and developing a strong safety culture for its workforce. ABS makes a difference both to people's working lives and the quality of the environment. ABS empowers employees with the knowledge, tools and authority to maintain safety at work and in everyday life. The organization's safety record has been compiled on countless ships, offshore facilities, shipyards, industrial sites and offices globally. ABS is vigilant in its goals to improve safety practices and dedicated to keeping the workplace a safe environment.

ABS SAFETY PERFORMANCE

In a long safety tradition, each year's successes form the foundation of the next year's achievements, fueling the voyage that has made ABS a global Health, Safety, Quality and Environmental (HSQE) leader. The ABS field staff continues to have weekly safety meetings, and office staff meets monthly to discuss specific safety issues locally or cover elements of the safety theme that ABS develops each year. In 2023, the safety theme was "SafetyPresent," a program dedicated to mental focus and monitoring changes in behaviors and conditions in the immediate environment, in addition to recognizing how these behaviors and conditions may change over time while completing tasks or migrating to different areas. The primary focus of this program in 2023 was to highlight high-risk hazards and activities faced by ABS personnel.

In 2023, ABS issued 13 Golden Eagle Health and Safety awards to individual employees worldwide dedicated to a proactive health and safety program, and the Chairman's Safety award was issued to four port offices. This further demonstrates that ABS is a safety-driven organization and is a testament to the safety awareness of its staff, their commitment to safe practices and procedures, and the success of the organization's overall safety methodology.



Source: ABS, Informa (LMIU) Database, December 2023

OCCUPATIONAL HEALTH AND SAFETY PERFORMANCE

The organization's ongoing safety excellence initiative incorporates strong occupational health and safety processes and policies, including a Stop Work Obligation rule authorizing all employees to intervene if safety is in question in any aspect of their work. ABS continues to increase engagement in leading safety behaviors, including timely reporting of potential incidents or hazards and documenting near misses. Health and Safety campaigns and robust incident reporting campaigns were used to reinforce reporting non-loss incidents.

- ABS' three-year averages of key safety measurements continue to be among the best in the maritime industry:
 - Lost-time incident rate (LTIR) of 0.18
 - Total recordable injury rate (TRIR) of 0.22
- ABS employees continue to make good use of the global reporting system to capture unsafe conditions, unsafe behaviors, near misses, and work-related injuries or illnesses.
- ABS maintained its ISO 45001 certification in 2023, with external audits performed by the British Standards Institute (BSI).

QUALITY PERFORMANCE

Through 2023, ABS' focus on industry fundamentals allowed the company to grow its classed fleet to 289 million gross tons (m gt); strengthen its leading position in existing fleet and orderbook share; maintain industry leadership across the entire global offshore market; and continue to guide the industry in safety.

In 2023, ABS continued high-quality service delivery to a global client base. ABS maintained its leading position on overall Port State Control (PSC) performance, being the top-performing Recognized Organization (RO) in the three most active PSC regions of the world since 2017.

- U.S. Coast Guard (USCG) – ABS maintained zero RO-related detentions for the last 15 years.
- Paris MoU – ABS had one or fewer RO-related detentions each year over the last 11 years.
- Tokyo MoU – ABS averaged one RO-related detention per year over the last eight years.

ABS GROUP OF COMPANIES, INC. SAFETY PERFORMANCE

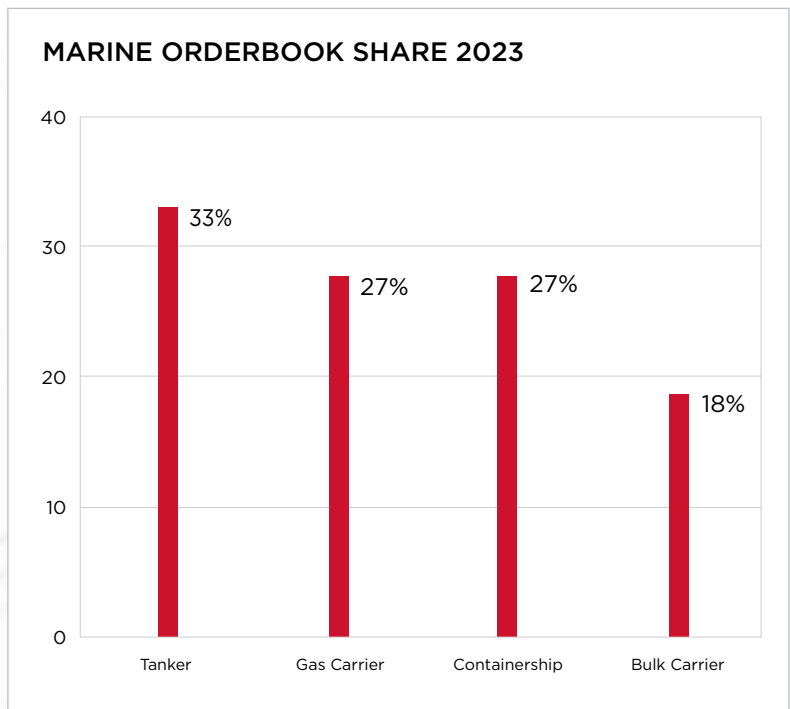
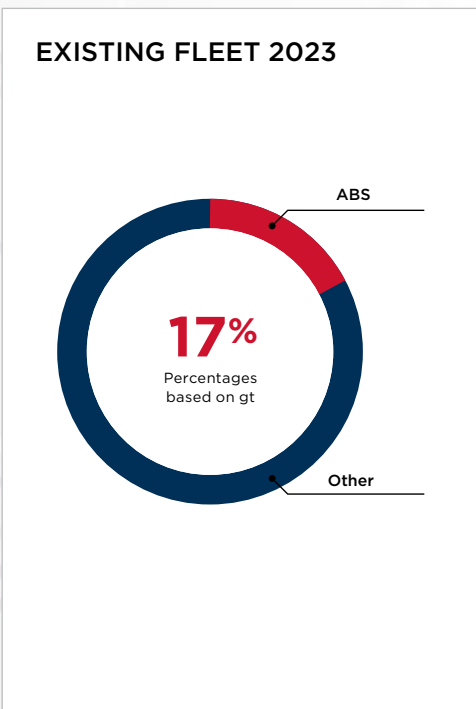
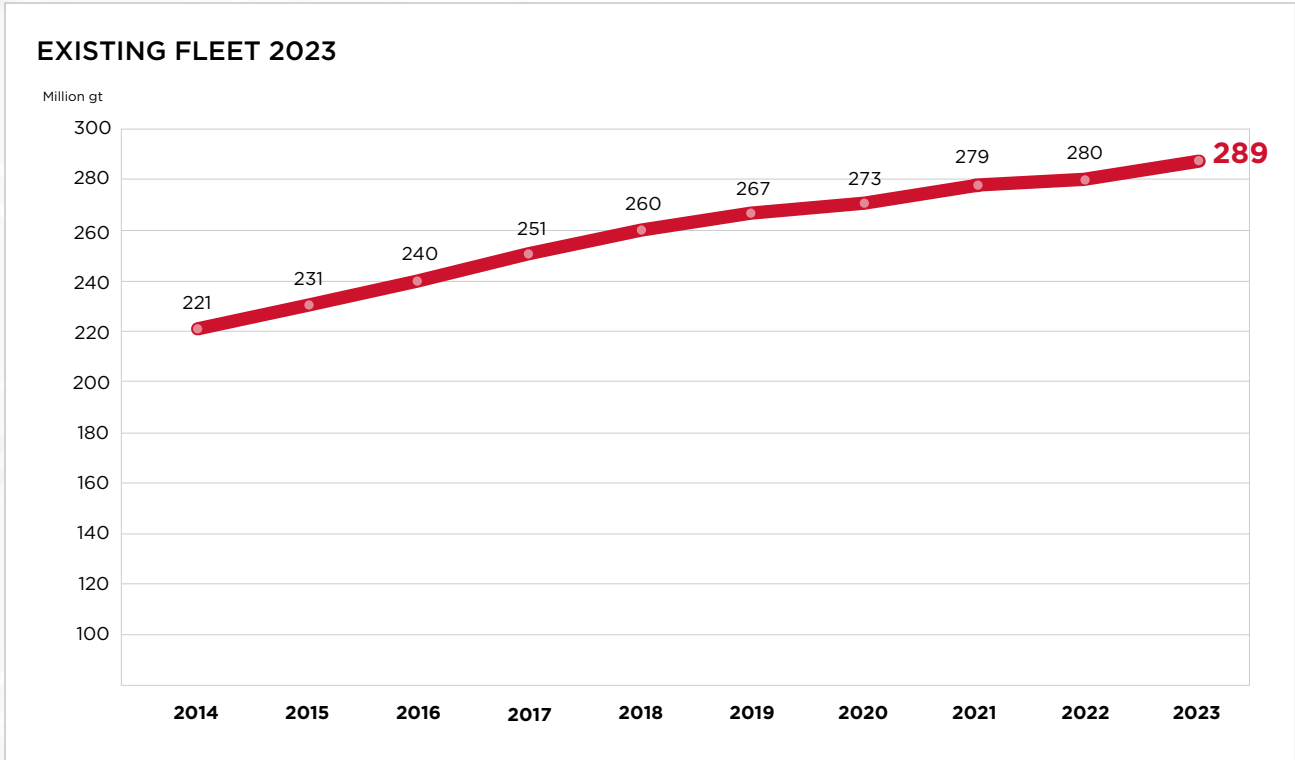
Building on the parent organization's ongoing commitment to its safety mission, ABS Group of Companies, Inc. (ABS Group) surpassed eight years without an LTI in 2023.

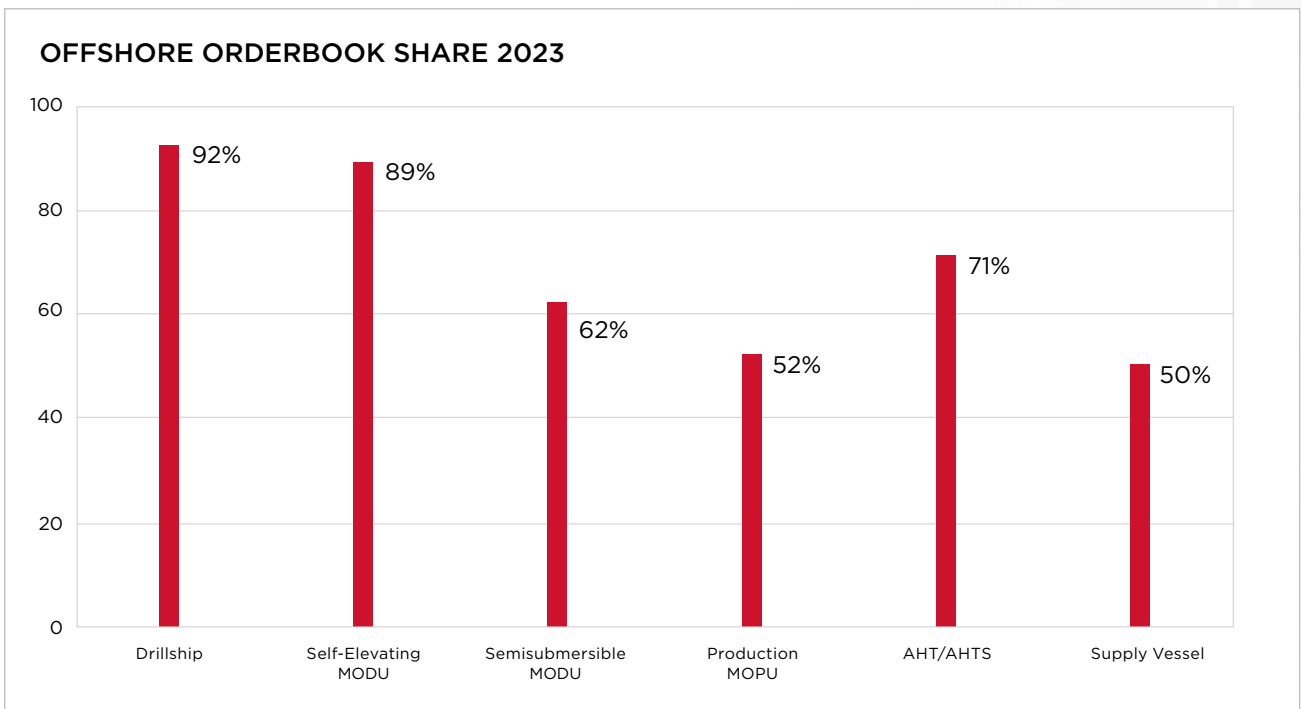
In 2023, ABS Group issued two Golden Eagle Health and Safety awards to individual employees worldwide, while the Chairman's Safety award was issued to the Risk and Reliability team.

- ABS Group's three-year average of key safety measurements continue to be among the best in its industry:
 - Lost-time incident rate (LTIR) of 0.00
 - Total recordable injury rate (TRIR) of 0.00
- ABS Group employees continued to make good use of the global reporting system to capture unsafe conditions, unsafe behaviors, near misses, and work-related injuries or illnesses.
- ABS Group achieved continued certification to ISO 45001 in 2023, with external audits performed by the British Standards Institute (BSI).

This achievement demonstrates ABS Group's focus on continually improving the effectiveness of its health, safety, quality and environmental culture, performance and management system.

INDUSTRY LEADING PERFORMANCE







SUSTAINABILITY AND TECHNOLOGY

The maritime industry's unique place at the heart of global commerce makes it critical to the success of the worldwide drive toward sustainability and decarbonization.

Recognizing this, ABS has long dedicated itself to shaping the future by guiding the safe development, application and use of maritime technologies. This dedication to the mission has made ABS a global leader in class. However, as evidenced by the achievements of 2023, it has also positioned the organization at the vanguard of technology development efforts in the marine and offshore industries.

PLAYING A CRITICAL ROLE IN THE ENERGY TRANSITION

The journey to a low-carbon future is, by nature, a technology-centric endeavor. Achieving net-zero emissions will depend on technological advances supporting the worldwide shift to new fuels and the development of new systems and strategies regarding energy use and resource consumption.

Shipping's critical role in helping society deliver a global energy transition was underscored in an address in March 2023 to the energy industry conference CERAWEEK by ABS Chairman and CEO Christopher J. Wiernicki. He noted that the maritime industry will be fundamental to supporting the development of hydrogen and carbon value chains, citing the fact that hydrogen, either in the form of ammonia or other hydrogen carriers, and liquefied carbon dioxide (LCO₂) will be transported by ship, making shipping the vehicle and enabler for a worldwide shift to low- and zero-carbon fuels.

The maritime aspect of the global energy transition was also the focus of the Fourth Annual ABS Sustainability Summit, which launched London International Shipping Week in September. In his opening address, Wiernicki noted that although the journey to 2050 will be difficult, ABS research not only shows that it can be done, but also maps a pathway to get there. Key elements of reaching net zero, Wiernicki said, are the application of energy efficiency improvement technologies – reducing the global fleet's aggregate fuel consumption by 15 percent – and onboard carbon capture for the oil-burning fleet – reducing CO₂ emissions by 70 percent.

LEADING THE DRIVE TOWARD A GREENER FUTURE

As the maritime industry's decarbonization journey progresses, the calculation of greenhouse gas (GHG) emissions is a growing part of doing business. That is why, in March, ABS entered into a joint development project (JDP) with all the leading Korean shipyards to create a standardized approach to the calculation of Scope 3 GHG emissions, which for shipbuilders covers emissions generated at all stages of the vessel construction process.

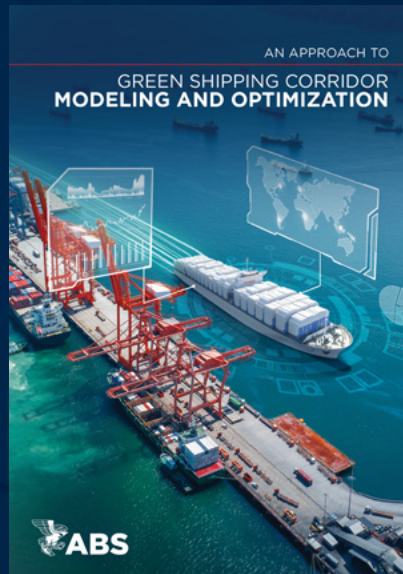
In June, ABS and Valholmen VOC Recovery signed a letter of intent (LOI) to develop, in cooperation with Wärtsilä and Ulstein, a pioneering vessel capable of capturing volatile organic compounds (VOCs) emitted during crude oil cargo operations. Each year, oil cargoes emit millions of tons of CO₂ equivalents, of which some 60 to 80 percent are VOCs that escape during crude oil loading. The ABS-classed VOC recovery vessel will liquefy this otherwise wasted resource so that it can be put to industrial use – including, potentially, as a fuel for ships capable of running on liquefied petroleum gas (LPG).

Historically, one of the main pillars supporting ABS' efforts to cultivate developing concepts and technologies has been its industry-leading research and publications. In this tradition, one of ABS' most notable publications in 2023 addressed the evolving global fleet. In June, ABS published its *Requirements for Hydrogen-Fueled Vessels*, becoming the first classification society to develop and publish an expansive set of Rules to guide industry in the safe use of this challenging new fuel.

SPOTLIGHT

WORLD'S FIRST GREEN SHIPPING CORRIDOR MODELING AND SIMULATION SERVICE

In a world first, ABS launched a Green Shipping Corridors Simulation service to support the design and development of clean energy initiatives. Through the use of digital twins and advanced computer modeling, the pioneering service provides advanced analysis and detailed simulations from pre-feasibility stages through the full life cycle of corridor development. The model generates a broad range of rich data that is critical to policy and investment decision-making, including fleet fuel mix, newbuilding vessel investment needs, annualized port investments, fuel demand prediction in specific ports, fuel storage requirements at specific ports and year-over-year fuel procurement for port bunkering stations. ABS also released a new publication, *An Approach to Green Shipping Corridor Modeling and Optimization*, which analyzes two green shipping corridor case studies: the Singapore-Rotterdam containership initiative and the Australia-Japan iron ore bulk carrier proposal.



SPOTLIGHT

LEADING GUIDANCE FOR THE ENERGY TRANSITION

In September, ABS released its latest annual industry-leading Outlook on the green energy transition and assessment of the decarbonization journey. *Beyond the Horizon: View of the Emerging Value Chains* focuses on carbon capture, energy efficiency and green fuels within the roadmap to reaching net zero by 2050.

Released at the ABS Sustainability Summit during London International Shipping Week, the Outlook gives an in-depth analysis of the carbon, ammonia and hydrogen value chains, concluding that the industry will need to accelerate investment in carbon capture technology, energy efficiency technologies and new fuel technologies to achieve net zero by 2050. It also examines the obstacles and opportunities for the adoption of alternative fuels and the actions shipowners must take to secure future fuel supply chains, considering that growing demand for higher volumes of synthetic and green bunkers is likely to engender competition for these fuels from other industry sectors.

ABS research highlights how shipping will play a pivotal role in the global clean energy transition and models scenarios for the effect of decarbonization on seaborne trade and the potential for altered trade patterns to reshape the world fleet. The report notes that while the transition to low and ultimately net-zero carbon operations will require substantial investment that may change the dynamic of shipping's commercial relationships, it is expected that shipping operations will benefit from reduced fuel use, lower emissions, higher asset values and simplified regulatory compliance.



CONTINUING LEADERSHIP IN ALTERNATIVE FUEL TECHNOLOGIES

Alternative low- and zero-carbon marine fuels are necessary components of the maritime industry's decarbonization drive. Liquefied natural gas (LNG) currently has a leading role among alternative maritime fuels and is likely to do so for some time. Its critical contribution to shipping's decarbonization journey was detailed by Christopher J. Wiernicki in the keynote address to U.S. Coast Guard leadership at the Liquefied Gas and Alternative Fuels Senior Executive Forum in January. He noted that although LNG is a key fuel in the energy transition, it is itself a fuel in transition, which also has several important issues to resolve. Later in the year, ABS released a new report, *Examining the LNG Value Chain*, which provides a comprehensive analysis of LNG markets, technologies and trends. Along with an in-depth assessment of the upstream, midstream and downstream operations of the LNG value chain, the report addresses environmental factors, regulatory frameworks and other efforts to mitigate emissions.

Meanwhile, methanol is increasingly being recognized as a compelling alternative marine fuel offering practical benefits related to storage, handling and tank-to-wake carbon intensity reduction. Recognizing this, in January, ABS signed a JDP with Pacific Carriers Ltd. (PCL) and PaxOcean to assess methanol as a marine fuel, with a particular emphasis on retrofitting methanol propulsion into existing vessels.

In April, ABS invited leading members of the Greek shipping community to an afternoon of presentations and panel discussions analyzing the current state of methanol's development track, with a particular focus on viability, advantages and roadblocks in the methanol pathway. Named the Athens Methanol Forum: Unlocking the Value of Methanol, the event gathered shipowners, operators, shipyards and equipment manufacturers to hear ABS specialists share material on market trends for alternative fuels, existing and emerging technologies supporting methanol's scale-up, and the current regulatory framework around methanol. Soon after, ABS awarded approval in principle (AIP) to a low-flashpoint methanol fuel system designed by Korea Shipbuilding and Offshore Engineering (KSOE).

Biofuel technology also advanced in 2023 with the support of ABS. Through its own research and participation in a number of pilot projects on the application of biofuels, ABS found that so-called "drop-in biofuels" have the capability to improve a vessel's Carbon Intensity Indicator (CII) rating regardless of the type of fuel used. In a presentation to maritime industry leaders, ABS experts explained that drop-in biofuels could become a powerful new tool to accelerate fleet decarbonization. It demonstrated that a vessel burning heavy fuel oil (HFO) could see its CII rating go from D to A by adding a 30 percent biofuel blend, a vessel burning methanol could move from a C to an A rating by adding a 30 percent biomethanol, and an LNG-fueled vessel could move from a C to an A rating by adding a 30 percent blend of biomethane.

SAFETY LEADERSHIP FOR NEW DIGITAL TECHNOLOGIES

Mindful of the ever-increasing importance of digital technologies to the maritime world of tomorrow, ABS entered into several agreements designed to develop and bring to market emerging digital building blocks of the future. One agreement has ABS working with Hanwha Ocean to conduct JDPs aimed at examining digital developments related to smart yards and smart ships with a focus on safety, cyber resilience, autonomous, remote control and smart functionality.

Under another agreement, ABS and a U.S. shipping company Crowley are jointly exploring the application of visualization technologies — in augmented reality (AR) and virtual reality (VR) environments — to the needs of survey, inspection and maintenance operations. AR technologies are also part of a new series of research projects between ABS and Texas A&M University investigating the safety implications of wearable technology aboard ships and offshore assets.



SPOTLIGHT

NEW COLLABORATION FOR ONBOARD CARBON CAPTURE

In June, ABS announced its invitation to a 13-member group of international experts convened to study five specific areas of onboard carbon capture: technologies, regulations, operational parameters, financial impacts and infrastructure. In the absence of abundant and affordable carbon-free fuels, onboard carbon capture and storage will be an important part of the journey toward marine decarbonization. The collective knowledge, experience and expertise and resources of this group will be applied to overcoming the technical, regulatory and economic challenges associated with this innovative approach to emissions reduction.



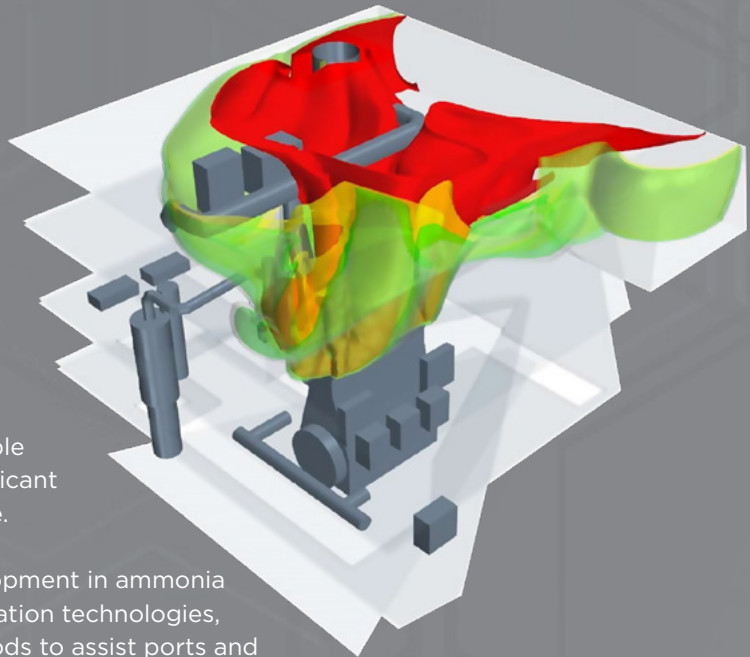
SPOTLIGHT

SIMULATION AND MODELING TACKLE THE AMMONIA CHALLENGE

Thanks to its potential for zero-carbon emissions, ammonia is widely viewed as a promising fuel solution for a more sustainable industry, but its high toxicity presents significant operational challenges on board and ashore.

In May, ABS announced a pioneering development in ammonia safety. Using advanced modeling and simulation technologies, ABS developed emergency response methods to assist ports and crews in responding to ammonia leaks or spills. This is the first step toward building a comprehensive and fast ammonia release response system that is capable of predicting the behavior of an ammonia plume and directing emergency mitigation services accordingly.

An industry leader in modeling and simulation, ABS combined those techniques with Computational Fluid Dynamics (CFD) to create a high-fidelity model that replicates ammonia dispersion patterns in the engine room. Using this new model, ABS specialists studied the impact of various ventilation approaches on the behavior of ammonia plumes resulting from leakages from the fuel lines, revealing optimum methods to vent the ammonia plume. The resulting dynamic model can predict how an ammonia plume will respond to a range of parameters such as wind speed and direction, humidity and relationship of the vessel to port.



One of the most exciting, advanced technologies on the verge of becoming a reality for the maritime sector is additive manufacturing (AM), more popularly known as 3D printing. In October, ABS announced its involvement in three significant initiatives in this emerging area. First, ABS signed a memorandum of understanding (MOU) to work with key Korean industry stakeholders on the development of 3D printing technology that can be used to manufacture spare parts on vessels at sea. The second is a three-year project between ABS and Pelagus 3D (a joint venture of ThyssenKrupp and Wilhelmsen) dedicated to on-demand spare part manufacturing for marine and offshore assets. The project will cover AM-related initiatives, including manufacturer qualification, parts certification, and the continued development of industry standards and guidelines. The third effort is the most ambitious 3D printing project yet attempted: the manufacturing of a ship's propeller. Working with Mencast Marine, the Singapore University of Technology and Design (SUTD), and Singapore's National Additive Manufacturing Innovation Cluster (NAMIC), this project intends to produce high-quality units capable of satisfying ABS' rigorous classification standards for propeller production.

Battery technology is an important element of a decarbonized future. In February, ABS issued a new technology qualification (NTQ) to Gennal Engineering for its design of a new battery system. Named Blue G, it is based on vanadium redox flow technology, in which vanadium ions in solution are the charge carrier. Among the features that make this technology a potential game-changer are the capability to charge/discharge without excessive heat generation, a long lifespan, improved energy capacity over many battery systems currently in service and safe disposal since the vanadium can be easily extracted and reused when the battery is decommissioned.

Product Design Assessment (PDA) certification is another means ABS uses to help new technologies enter safely into commercial use. In February, ABS issued its first CyberSafety PDA to Nabtesco Corporation for its designs of main engine and main propulsion remote control systems. ABS' next CyberSafety PDA was issued in May to Kongsberg Digital for its vessel-to-cloud data infrastructure platform named Vessel Insight. The platform also earned a PDA for smart infrastructure in accordance with the *ABS Guide for Smart Functions for Marine Vessels and Offshore Units*. Together, the approvals attest that the platform provides a robust framework for cyber-attack detection, identification, response, recovery and protection.

CULTIVATING FUTURE TECHNOLOGY DEVELOPMENT

When ABS launched its *Guide for Smart Technologies for Shipyards* in April, it also issued a PDA to Seatrium for its Mobile Wearable Personal Device Monitoring System. The system is integrated into smart health and safety devices worn by workers in smart shipyards and on smart marine facilities to provide services including fall detection, geo-location, emergency connection and real-time safety notification. In recent years, Seatrium has emerged as a valued research partner for ABS, particularly through a multiyear JDP geared toward pioneering digital transformation for the offshore, marine and energy industries.

Historically, MOUs have signaled the opening of a new chapter in the development of emerging technologies, practices and procedures. In 2023, ABS entered into three particularly notable MOUs for four evolving areas of industry development. In January, ABS and HD Hyundai signed a comprehensive MOU to continue working on industry-leading autonomous projects. Building on a strategic framework agreement arrived at the previous year, they will expand their developmental efforts in autonomous navigation technology into critical vessel machinery and safety systems.

In April, ABS and Mencast Marine signed an MOU to further develop AM for the production of critical marine asset components. Specifically, the partners agreed to cooperate on the design, manufacturing, testing and qualification of marine components through AM. They will also work on the development of data analytics and artificial intelligence (AI) in the AM process and the development and validation of innovative solutions for sustainability through AM. Then, in October, ABS and Sea Forrest Power Solutions signed an MOU to drive the advancement of cutting-edge maritime electrification technologies. Areas covered under the agreement include studies of shore charging infrastructure, safety evaluation of battery room and enclosure designs and analyses related to safety aspects of electric vessel operation.

SPOTLIGHT

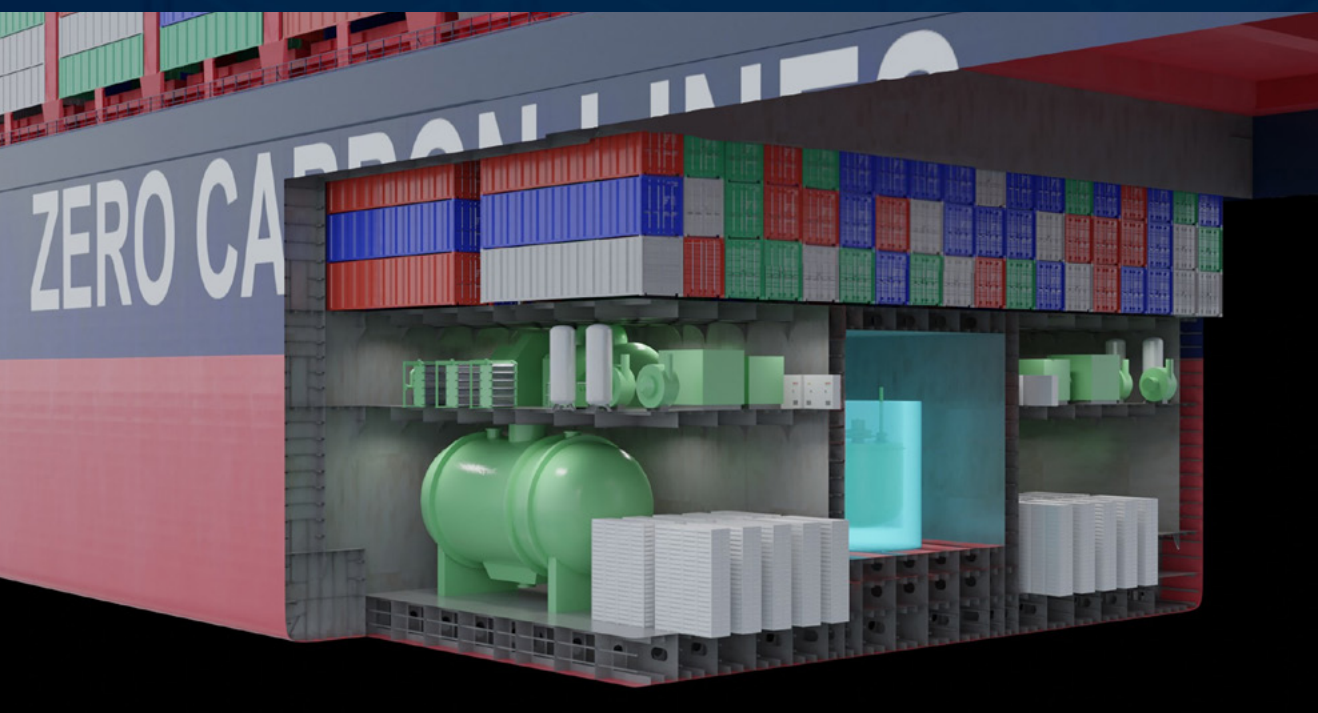
GROUNDBREAKING STUDY EXPLORES NUCLEAR PROPULSION

Nuclear propulsion has the potential to support a net-zero world. While advanced or small modular reactors may address some questions regarding safety, efficiency, cost and waste, still many questions remain.

In a groundbreaking study, ABS and Herbert Engineering Corp. modeled the transformational impact of nuclear propulsion on the design, operation and emissions of a 14,000 twenty-foot equivalent unit (TEU) containership and a 157,000 deadweight (dwt) tanker. The study explores the application of advanced modern reactor technology to commercial marine propulsion, with the aim of helping industry better understand the feasibility and safety implications of nuclear propulsion for the maritime world.

Taking input from leading nuclear reactor developers, the study modeled the impact of two, lead-cooled, 30-megawatt (MW) fast reactors on the containership, finding it would likely increase cargo capacity and operational speed while eliminating the need for refueling during its entire 25-year lifespan. For the tanker, the study found that the use of four, 5-MW, heat-pipe microreactors would decrease cargo capacity but would raise operational speeds and only require refueling once during its 25-year life. Both concept vessels would emit zero CO₂.

The study continues ABS' contributing role, and industry leading role, in the development of nuclear propulsion for commercial maritime use. ABS worked with the U.S. government to pioneer commercial nuclear ship power over 60 years ago. In fact, the maiden voyage of the *N/S Savannah*, to date the world's only nuclear-powered cargo ship, coincided with ABS' 100th anniversary, and today, ABS remains the only classification society in the world with this level of nuclear experience. More recently, the U.S. Department of Energy (DOE) awarded ABS a contract to research barriers to the adoption of advanced nuclear propulsion on commercial vessels. It also contracted ABS and the University of Texas to research the thermal-electric integration of nuclear propulsion on a cargo vessel.



GROUNDBREAKING ADVANCES AIDED BY ABS APPROVAL IN PRINCIPLE

AIP has long been a sure means of encouraging the further refinement and safe development of new and evolving technologies. Three notable AIPs awarded to Samsung Heavy Industries (SHI) in 2023 reflect this, as they apply to the emerging area of smart functionality and the ever-present concern of cybersecurity. The first was awarded for a hull stress monitoring system, and the second for a machinery health monitoring system. Both are parts of a JDP between ABS and SHI to enhance hull and operational safety through the use of smart ship technologies. The third was awarded for a system designed to meet the latest cyber resilience requirements, incorporating security zones with well-defined security capabilities, network protection safeguards and managed access for remotely controlled systems.

SPOTLIGHT

ABS LEADS NUCLEAR ENERGY FORUM IN WASHINGTON, D.C.

In September, ABS gathered nuclear energy experts, government representatives, academia and senior maritime industry leaders from around the world for a special forum on The Role of Advanced Nuclear Technologies in the Maritime Energy Transition. Held in Washington, D.C., the event attracted a capacity crowd. In four panel discussions moderated by ABS, representatives from shipyards, designers, nuclear technology developers, academia and a variety of government agencies addressed technology maturity, regulatory and safety/risk considerations, maritime industry readiness and port infrastructure readiness. The full-day conference confirmed the potential for advanced nuclear technologies in the maritime domain to help the clean energy transition, with project implementations likely in the next 10 to 12 years.

At the forum, ABS announced a major new initiative on ABS Rules for nuclear technology on maritime assets and confirmed its support for government and industry efforts to update outdated international and domestic regulations on the topic.

The day before the forum, ABS Chairman and CEO Christopher J. Wiernicki hosted a congressional briefing on Capitol Hill in coordination with the National Reactor Innovation Center and the bipartisan House Advanced Nuclear Caucus, in which he emphasized that turning advanced nuclear technology into a practical reality for the maritime industry is an important tool for helping the maritime industry achieve net zero by 2050, and has the potential to grow economic opportunity and high-tech jobs in the maritime industry. "The developmental path for nuclear energy at sea will require a concerted public-private effort in which innovation and system technologies are reduced to practice through modeling and simulation. There is a real opportunity right now for forward-thinking governments to drive the agenda with practical projects in controlled and regulated environments," he said.

ABS has attained a leading role in helping government and industry shape the future of advanced nuclear technology in the maritime domain, and in 2023, continued this role through various programs and key research initiatives with the U.S. DOE and multiple NTQ and AIP projects with industry.

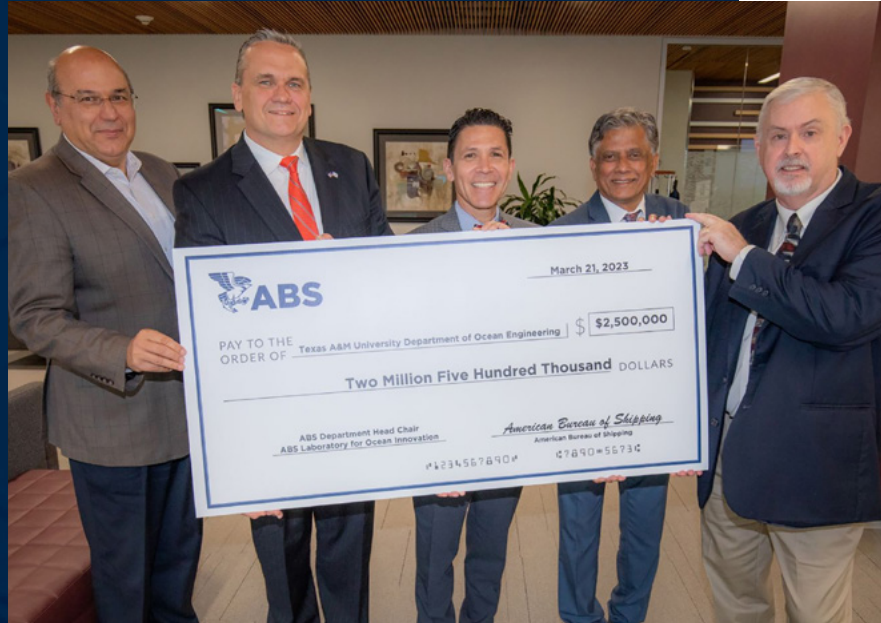


SPOTLIGHT

TACKLING THE INDUSTRY'S MOST PRESSING TECHNICAL CHALLENGES

ABS and Texas A&M University joined forces for a broad range of research activities, addressing the critical challenges facing the marine and offshore industries.

In March, the two organizations expanded their unique global strategic relationship with a \$2.5 million donation from ABS to endow the Ocean Engineering Department Chair and fund a new 1,200-square-foot ABS Laboratory for Ocean Innovation. This creates a maritime research powerhouse, uniting ABS' extensive marine and offshore experience with Texas A&M's world-class academic research capability. Students and specialists from both institutions will actively use the lab to manage and execute the significant body of research planned over the coming years.



In addition, ABS and the Texas A&M Engineering Experiment Station kicked off a spate of new funded research projects in a variety of areas, including ammonia as marine fuel, ship electrification, carbon capture and sequestration technology, AI and the safety of wearable industrial visualization equipment. The research seeks to adapt, as appropriate, emerging techniques and technologies to enhance the safety of the maritime industry and bring about a smooth transition to clean energy.

SPOTLIGHT

DEVELOPING A ROAD MAP FOR A GREENER SUEZ CANAL

In January, ABS and the Suez Canal Authority (SCA) signed an MOU to develop a long-term sustainability roadmap and decarbonization strategy for the canal, one of the world's busiest shipping routes. Under the agreement, they are working together to develop a decarbonization strategy, an assessment of energy use and emission intensity, and potential ways of reducing emissions in order to help advance the SCA's business plan for a green transition by 2030. SCA and ABS will also collaborate in developing a range of services, including technology selection, benchmarking, target setting, regulatory compliance documentation, carbon accounting and verification audits.



The intense pace of ship technology development was reflected in a number of additional AIPs awarded during 2023. As the industry pivots amid the global energy transition, many of these AIPs were focused on alternative fuels and carbon capture technologies.

Jiagnan Shipyard received an AIP for the Brilliance II IMO Type B cryogenic liquefied gas containment system for very large ethane carriers. ABS also approved an innovative gaseous hydrogen floating storage unit from Provaris. The unit is adaptable to a variety of applications, such as bunkering, buffer storage for green hydrogen production, and long-duration energy storage.

In the LNG arena, LNT Marine and the Shanghai Merchant Ship Design and Research Institute (SDARI) received an AIP for the evolved design of their LNT A-Box LNG containment system. Hyundai Heavy Industries (HHI) and KSOE also received approval for two AI-based advances for LNG fuel: a smart boil-off gas management system and a smart fuel gas system.

Hanwha Ocean received an AIP for a new onboard carbon capture technology based on the absorption, regeneration and separation of exhaust gases. A Bumi Armada design for a floating carbon storage and injection unit was also approved. The unit is capable of storing and injecting LCO₂ into depleted oil and gas fields and aquifers.

ABS approved a novel design for a floating offshore nuclear power barge from KSOE and KEPCO Engineering and Construction Company, Inc. (KEPCO E&C). The floating small modular reactor (SMR) barge is intended to serve as offshore power generation for remote communities and island electrification.

In digital technologies, Nippon Yusen Kabushiki Kaisha (NYK), Monohakobi Technology Institute (MTI) and Japan Marine Science Inc. (JMC) received an AIP for the design of a pioneering, fully autonomous ship framework. This was developed as part of the Nippon Foundation's Meguri 2040 Fully Autonomous Ship Program.

SPOTLIGHT

GLOBAL ELECTRIFICATION CENTER SUPPORTS NET-ZERO TRANSITION

In September, ABS launched its global ABS Electrification Center in Singapore to assist maritime decarbonization projects. The center's engineers and technical specialists will use all the latest technologies, including ABS' extensive experience in modeling and simulation, to support a range of cutting-edge electrification projects for shipowners, shipyards and other maritime stakeholders across the Asia-Pacific region and around the world.

The center will also aid the electrification of harbor and coastal craft aligned to initiatives of the Maritime and Port Authority of Singapore, along with other electrification-related efforts, including research and development, design review, rule development and new construction and retrofit projects.

It is the latest step in ABS' ongoing global collaboration on a number of advanced electrification initiatives, including Seatrium's Floating Living Lab project and its proposals for a battery-powered fleet of hybrid tugs; Wärtsilä's JDP to design a hybrid electric LNG carrier; Greenbay Marine and Sea Forrest's development of a fully electric containership and PSA Marine's evaluation of the energy efficiency of a new hybrid design for pilot launch boats.





GLOBAL MARINE

To achieve and maintain a leadership position in any global industry requires vision and perseverance. This is particularly true in the maritime industry, which is subject to constant, fast-paced and profound change, and will likely remain so for years to come.

ABS continued its safety leadership in the maritime industry during 2023. The ABS-classed fleet grew to 289 million gross tons (m gt) in 2023, and ABS further strengthened its number one position in global orderbook share at 24.2 percent, holding leading positions with both shipowners and shipbuilders. Among shipbuilding countries, ABS is number one for orderbook share in the U.S., Singapore, China, Brazil and South Korea. Based on shipowner's country, ABS leads orderbook share in Taiwan, Denmark, Brazil, Singapore and Hong Kong. ABS is number one for existing fleet share for owners in the U.S., Hong Kong, Singapore, Greece, Denmark and Brazil. In 2023, in the global marine sector, ABS continued to lead in classed tonnage of the existing fleet for tankers. ABS also led the orderbook share for tankers and gas carriers and maintained strong orderbook positions for containerships and bulk carriers.

Underpinning every milestone and statistic is the commitment to safety at sea that ABS has demonstrated since its earliest days. In 2023, that commitment was recognized with a special award from the Coast Guard Foundation at its Texas Salutes the Coast Guard event. In living its commitment, ABS has always encouraged all maritime stakeholders to make extra efforts in the service of safety and has taken steps to recognize those who do. One example of this is its nearly seven decades of support for the Automated Mutual-assistance Vessel Rescue (AMVER) system, a voluntary reporting system founded by the U.S. Coast Guard (USCG) in 1958 to engage the global commercial fleet in the service of search and rescue. Today, it is used by search and rescue authorities worldwide to identify persons in distress at sea and arrange for help to reach them. Each year, ABS sponsors the AMVER Awards ceremony to recognize companies that demonstrate an above-and-beyond commitment to this important service. The 2023 ceremony, held in Oslo, honored 242 vessels from 31 Norwegian owners and operators. Additionally, the commitment of ABS Chairman and CEO Christopher J. Wiernicki was also recognized with the 2023 GREEN4SEA Leadership Award.

BUILDING THE FUTURE TODAY

In 2023, Wiernicki was selected as the first lecturer invited to teach at the National University of Singapore's College of Design and Engineering under the Visiting Professorship Program sponsored by the Seatrium organization. Wiernicki's remarks on receiving the visiting professorship included this encapsulation of the forces driving many aspects of global maritime activity today: "We are living in the early innings of a decade of change driven by digitalization and the clean energy transition. It will reshape our entire industry, disrupting established business models, relationships and operational strategies. The technology-driven advances will require new ways of thinking as well as a radically altered skills profile."

Indeed, new ways of thinking throughout the industry can be seen in several notable ABS achievements in 2023.

To aid the safe evolution of hydrogen technology, ABS published its new *Requirements for Liquefied Hydrogen Carriers*, which builds on its industry-leading guidance in this area by providing much-needed support on a range of important concerns. These include assessment of risk, development of novel concepts and qualification of new technologies in such areas as cargo containment, piping systems, ventilation and fire protection. ABS also joined with the leading companies in Korea's hydrogen industry to support development of a 40-seat tourism vessel that will use a 350-kilowatt (kW) hydrogen fuel cell to power an electric propulsion system. During Singapore Maritime Week, ABS convened an expert panel discussion that provided new perspectives and insights on the development of the hydrogen and ammonia value chains.

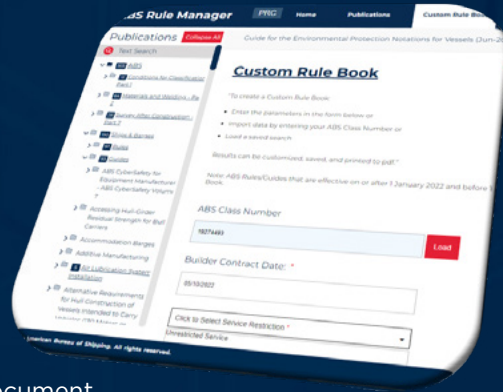
Ammonia as a marine fuel was a key area of development for ABS in 2023. In June, the ABS-classed 7,100 twenty-foot equivalent unit (TEU) containership *ALS Ceres* was delivered to Asiatic Lloyd Maritime. The state-of-the-art vessel was delivered with the ABS Ammonia Fuel Ready Level 1C and Methanol Fuel Ready Level 1C notations, which signify that a concept-level study has been completed for its future conversion to the use of ammonia and methanol as fuel.

SPOTLIGHT

ABS CUSTOM RULE BOOK A CLASSIFICATION FIRST

Recognizing that the future will require new types of vessels and that the quantity and complexity of regulations continue to expand, ABS decided to help streamline the design, review and overall regulatory process. The industry needed a way to create a single document that contained all Rules and notations applicable to each individual vessel. In January 2023, ABS launched Custom Rule Book, a revolutionary development in the classification of maritime assets.

The advanced digital Rule book produces a project-specific set of Rules and requirements on demand. In this first-of-a-kind development for classification, ABS MyFreedom™ Client Portal users can quickly filter over 140 Rules and Guides and 600 notations – the equivalent of 28,000 pages of material – to generate a Custom Rule Book for their specific vessel or project. Users input a vessel's ABS Class number or specify a set of six attributes, and the system will create a custom collection of Rules applicable to the vessel or project. The Custom Rule Book will introduce significant time savings and efficiency into any design spiral.



SPOTLIGHT

ABS IN PIONEERING LCO₂ CARRIER STUDY

Recognizing that the transport of liquefied carbon dioxide (LCO₂) is critical to the developing carbon value chain and requires a new type of vessel, ABS joined Ecolog Services, Hanwha Ocean and Babcock International Liquid Gas Equipment in a pioneering joint industry project (JIP) to collaborate on the detailed design of a 40,000 cubic meters (m³) LCO₂ carrier. This first-of-its-kind scientific work focuses on large-scale CO₂ marine transport, which is essential to the development of the carbon value chain. The group expects the ultimate design to maximize energy integration and minimize greenhouse gas emissions while also being cargo-versatile and offering the capability for offshore offloading, as is required for the direct injection of LCO₂.



In 2023, ABS awarded several ammonia-related approvals in principle (AIPs) in support of the industry's energy transition. Korea Maritime Consultants received approval for the innovative design of a 3,600 TEU ammonia-fueled containership. A Hanwha Ocean design for a liquefied natural gas (LNG) carrier driven by an ammonia-fueled gas turbine was approved. HD Korea Shipbuilding and Offshore Engineering (KSOE) and HD Hyundai Heavy Industries (HHI) received approval for the design of a new emissions reduction system for ammonia-fueled vessels. In September, ABS signed a memorandum of understanding (MOU) to review an innovative design from HHI for a dual-fuel, very large ammonia carrier (VLAC) fueled by ammonia and LNG.

To further advance the use of alternative fuels, ABS engaged in three pioneering joint development projects (JDPs) in 2023. In the first, ABS joined Berge Bulk in a six-month project to explore the possibility of retrofitting a conventional oil-fueled bulk carrier to run on methanol. In the second, ABS allied with Asiatic Lloyd Maritime to study the feasibility of converting the fuel system of an ultramax bulk carrier from conventional diesel to methanol. In the third, ABS joined with Gaztransport & Technigaz (GTT) and DHT Holdings, Inc. to develop the design of an optimized LNG-fueled very large crude carrier (VLCC) and investigate design variables including LNG fuel volume, tank sizes and the vessel's Carbon Intensity Indicator (CII) rating.

ABS has also supported decarbonization journeys with its sustainability reporting service. Working together with ABS, McAllister Towing, one of the oldest and largest marine towing and transportation companies in the U.S., released its inaugural sustainability report in November. ABS specialists worked with McAllister's team to provide greenhouse gas (GHG) inventory and sustainability reporting services, calculating the operation carbon intensity and benchmarking the performance of the McAllister fleet.

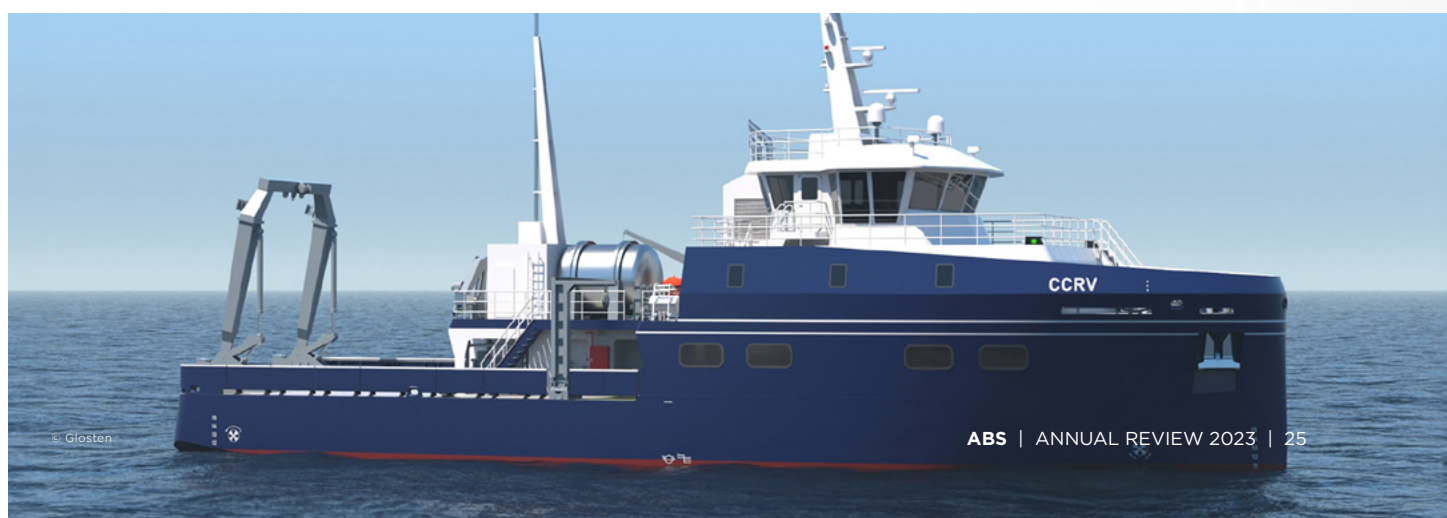
CONTINUED LEADERSHIP IN ADVANCED MARINE TECHNOLOGIES

In order to meet its emissions mandates, the global marine fleet of the future will need to employ a basket of technologies. Some of these technologies are still being developed, but many are making inroads into the fleet today. During the past year, ABS collaborated with industry and academic partners to help these new technologies make some notable advances along their development tracks.

In February, it was announced that a hydrogen-fueled research vessel commissioned by the University of California San Diego's Scripps Institution of Oceanography will be built to ABS Class. The vessel will feature a new hydrogen-hybrid propulsion system that integrates hydrogen fuel cells alongside a conventional diesel-electric power plant, enabling zero-emission operations.

In June, ABS issued AIPs to a coalition of PETRONAS, Mitsui OSK Lines (MOL) and the Shanghai Merchant Ship Design and Research Institute (SDARI) for designs of a 96,000-m³ LCO₂ floating storage and offloading unit and for an 87,000-m³ LCO₂ carrier.

Also in June, Sanmar Shipyard of Canada delivered the ABS-classed *Haisea Wamis* battery electric tug to HaiSea Marine, a joint venture of the Haisla First Nation and Seaspan. In July, the *Laura Maersk*, the world's first containership to use green methanol, made its maiden voyage. The *Laura Maersk*, which was officially named in September, is the first of 19 dual-fuel engine vessels that can sail on green methanol on order from Maersk to ABS Class.



In July, the Algoma Central Corporation ordered two methanol-ready, 37,000 deadweight (dwt), ice class product tankers to be built to ABS Class. Algoma had previously ordered two methanol-ready, 72,250 dwt Kamsarmax-based, ocean belt self-unloading vessels also to be built to ABS Class.



Also in July, ABS awarded AIP to HHI for a novel ship refrigeration system using ammonia as its coolant. Ammonia is considered an eco-friendly refrigerant as it has zero ozone depletion potential. In September, ABS issued AIP to Hudong-Zhonghua (HZ) Shipyard for the design of what would be the world's largest LNG carrier at 271,000-m³ capacity. Almost two decades ago, HZ, working with ABS, became the first Chinese yard ever to build an LNG carrier. It is fitting that the two companies pioneer this new design, which features dual-fuel propulsion and an air lubrication system for the hull to increase fuel efficiency.

In November, the *Saildrone Voyager*, a 10-meter unmanned vessel, became the first autonomous asset built to ABS Class under its *Requirements for Autonomous and Remote Control Functions*, following AIP for the design earlier in the year.

SPOTLIGHT

CUTTING-EDGE ABS GLOBAL LNG ACADEMY INAUGURATED IN QATAR

In December, ABS inaugurated the ABS Global LNG Academy, a cutting-edge training center dedicated to using the latest techniques to educate mariners in modern LNG vessel operations.

Located in Doha, Qatar, and supported by QatarEnergy, the Academy is a coordinated effort with industry partners, who are working together to make the ABS LNG Academy the global epicenter for LNG-related training and development. Establishing the training center is also a key part of ABS' support of Qatar's National Vision 2030 and the Tawteen Program, which focuses on education and quality employment for Qatari nationals.

The center is designed to offer theoretical and practical training to support safety in the various aspects of LNG carriage and the safe handling of LNG as a marine fuel. The industry-leading training facility goes beyond the average training experience, offering innovative online, virtual and classroom options for interactive and continuous learning.

In cooperation with Nakilat, ABS is delivering the industry's first fully operational LNG metaSHIP. Powered by Orka, the MetaSHIP is a highly realistic virtual asset, built to scale from vessel drawings, and it takes learners on virtual field trips – providing a powerful, immersive learning experience in a dynamic simulated training environment.



ADVANCING INDUSTRY KNOWLEDGE

Education and training are critical to the development and progress of the maritime industry if the multitude of new digital-driven technologies – on which the future will increasingly depend – are to be safely absorbed by the workforce. In that spirit, HD Korea Shipbuilding and Offshore Engineering (KSOE) developed a series of advanced training courses and built new facilities to impart digital literacy to its next and present generations of maritime personnel. Assessors from the ABS Academy found that the courses and the state-of-the-art Operations Training Simulator meet the rigorous standards outlined in the *ABS Guide for Certification of Maritime Education Facilities and Training Courses*.

Historically, regulatory demands have been among the key drivers and shapers of technological development in the maritime industry, but these regulations are often complex. Recognizing this, ABS regularly offers seminars and produces publications that provide practical guidance on how to understand, absorb and comply with new and developing regulations.

One notable event in 2023 addressed the specific regulatory framework applying to the containership sector. Convened in Germany, the ABS Global Containership Summit offered the industry a holistic overview of current and developing regulations and the unique challenges they pose to strategic thinking, with particular emphasis on the emerging technologies and alternative fuel options that will shape the sector's low-carbon future.

SPOTLIGHT

ABS REPORT PARSES A COMPLEX REGULATORY LANDSCAPE

The regulatory landscape in the maritime industry is complex and ever-changing and only grows more so with the passage of time. To help maritime stakeholders navigate the sea of sometimes confusing regulations to which their organizations and vessels may be subject, ABS published its *Regulatory Trends and Impact 2023*, a major new report that summarizes global regulatory developments and guidelines and discusses their impact on the maritime industry. The report outlines key regulatory developments at the International Maritime Organization (IMO) and regional levels and addresses the local issues that may develop into a foundation for future regulations.

Regulatory Trends and Impact 2023 is one of three major efforts ABS has made to inform, educate and provide insights to maritime stakeholders on regulatory compliance, risk awareness and operational safety. The other two are *Regulatory Lessons*, a series of digital courses on developments from the IMO, and *Safety in Minutes*, a series of short videos highlighting potential safety hazards.

Among the key points covered in *Regulatory Trends and Impact 2023* are:

- The more ambitious deadlines of the revised 2023 IMO GHG reduction strategy, which will now consider the whole life cycle of marine fuels.
- The proposed mid-term GHG reduction measures, which consist of a technical measure regulating the reduction of the marine fuel's GHG intensity and an economic measure on the basis of a GHG emissions pricing mechanism.
- The potential impacts of the latest EU regional measures, including the FIT for 55 legislative package, the EU Emission Trading System and the FuelEU regulation that begins in 2025.
- Information about proposed U.S. policies for eliminating emissions of GHGs and other pollutants, for imposing carbon intensity standards on ship fuels and for cold-ironing requirements for ships at berth.
- The Panama Canal Green Route Plan 2050, which aims to reduce the canal's carbon footprint and promote sustainable practices, is also detailed in the new ABS report.



GLOBAL OFFSHORE

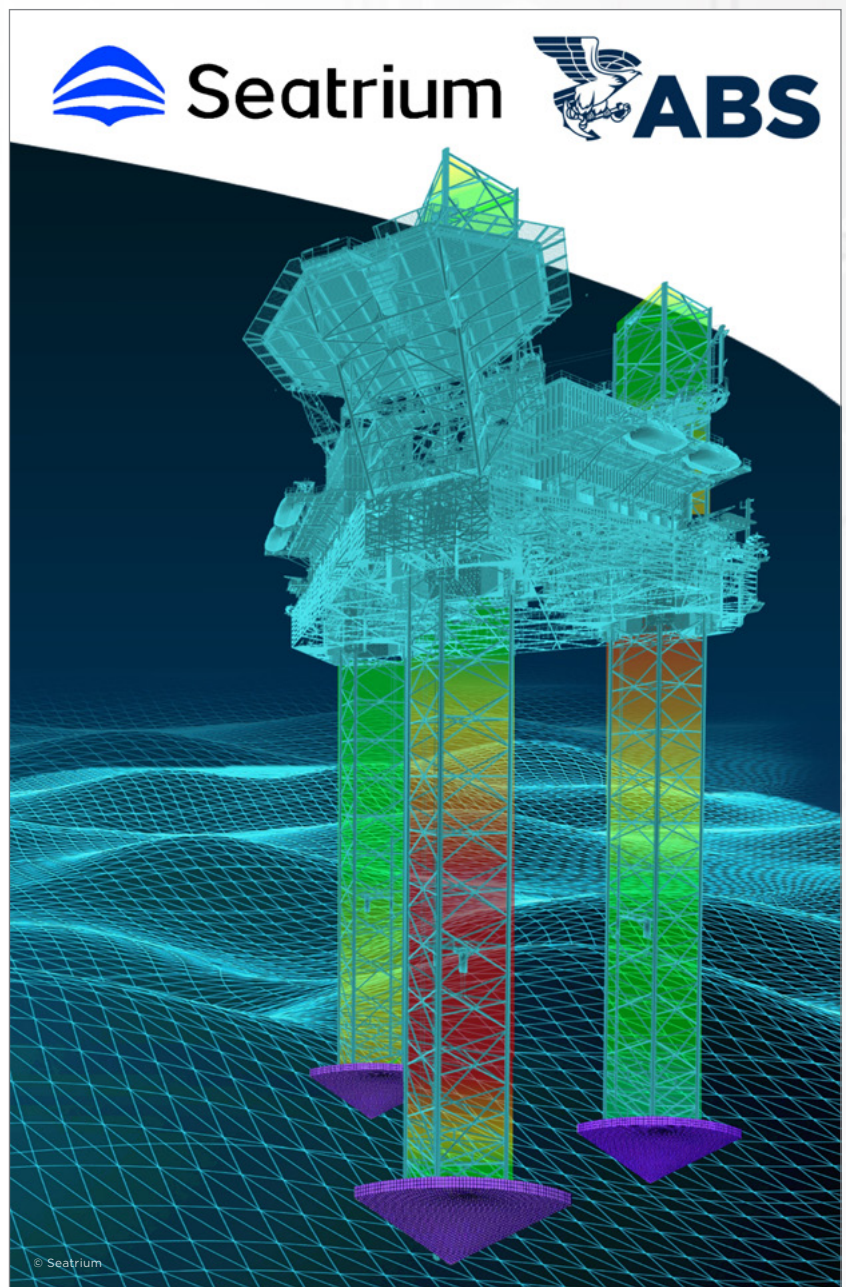
The offshore industry has operated on the cutting edge of technology ever since erecting the first oil platform out of sight of land in 1947. Those early pioneers called on ABS for technical and safety support to get that first development going. Today, ABS remains the trusted advisor and premier safety authority for the global offshore industry. ABS has helped all offshore sectors – exploration, production and support – develop the technologies needed to overcome the challenges of ocean depth and harsh environments.

Throughout 2023, ABS continued to lead in all segments of the offshore orderbook – exploration, production and supply vessels. ABS maintained 92 percent of drillship orders, 89 percent of self-elevating mobile offshore drilling unit (MODU) orders, 62 percent of semisubmersible MODUs, 52 percent of mobile offshore production units, 71 percent of anchor handling tug supply orders and had a 50 percent order share of all other supply vessels.

HELPING INDUSTRY ADVANCE TECHNOLOGY

Artificial intelligence (AI) tools are becoming increasingly important to the design and operation of complex systems. With that in mind, ABS participated in a groundbreaking study with the Massachusetts Institute of Technology (MIT) to use AI and machine learning methodologies to develop improved means of predicting offshore riser motion. The aim is to better understand the phenomenon of vortex-induced vibration (VIV) that affects the riser systems used by offshore platforms. Digital twins to model riser motion were created, and a series of experiments in MIT's Intelligent Towing Tank furnished the multiterabyte data sets that were then analyzed to map the complex forces behind VIVs.

In another digital advance, ABS and Seatrium collaborated on a project that resulted in the *Admarine 686* becoming the world's first self-elevating drilling unit (SEDU) to receive a structural health monitoring (SHM) class notation. The ABS SMART SHM notation recognizes a unit's onboard capability to monitor and analyze the condition of a range of key structural elements. In April, ABS recognized Seatrium as the first shipyard group to deploy smart technologies in its operations, as assessed according to the *ABS Guide for Smart Technologies in Shipyards*.



SPOTLIGHT

ABS DEVELOPS WORLD'S FIRST INTERNATIONAL REQUIREMENTS FOR OFFSHORE SPACEPORTS

Recognizing the increase in global demand for offshore spacecraft launch and recovery, ABS published the world's first international requirements for the design and construction of offshore spaceports, which are marine or offshore assets that conduct spacecraft launch and/or recovery. The *ABS Requirements for Building and Classing Offshore Spaceports* addresses various types of vessels used in this service, including barge-like, column-stabilized and self-elevating units.

ABS was ideally placed to develop these requirements because it has more than 75 years of experience in the offshore sector – more than any other classification society – and has been a trusted aide in the development of nearly all of the offshore sector's technology advances, including decades involved in the development of specialized offshore support vessels (OSVs). In some cases, these OSVs are being repurposed for use as or in connection with commercial spaceports.

ABS is working with Space Perspective, a spaceflight company based at Florida's Kennedy Space Center, to support the modification of one such OSV into the world's first marine spaceport for commercial use. The flights this new vessel will support are to be six-hour journeys in a pressurized capsule that is lifted into the upper reaches of the atmosphere by a giant hydrogen balloon, which will be launched from the Space Center or the marine platform.

ABS is at the forefront of offshore space support, having already engaged in a joint development project (JDP) with SpaceX to review the remotely controlled functions of autonomous rocket recovery dronships used for booster rocket recovery at sea. This new set of requirements is based on ABS' historical experience with offshore assets and on recent service experience gained helping leading aerospace rocket launch and recovery companies pursue the safe design and construction of offshore launch facilities.



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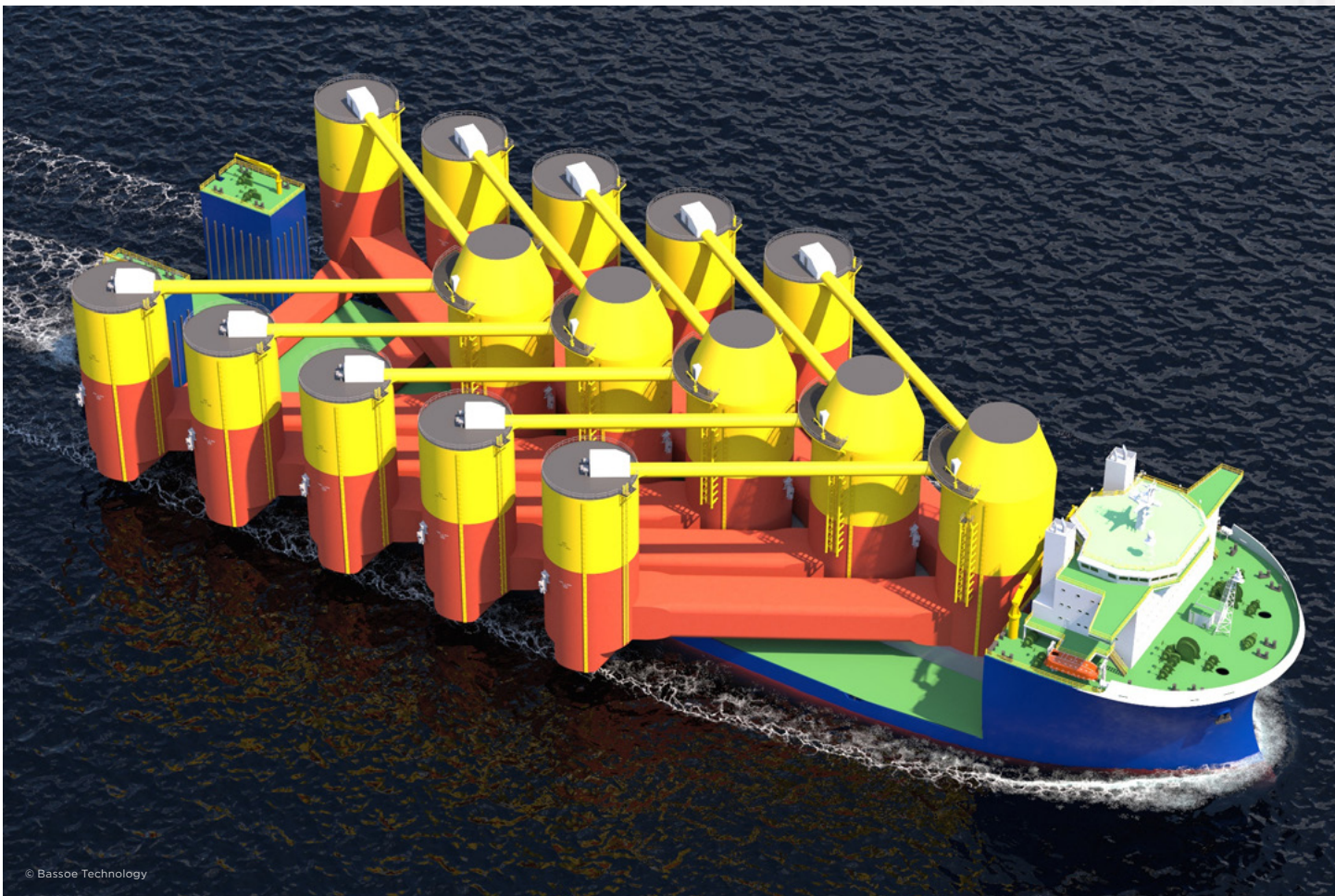
In 2023, two notable approvals in principle (AIPs) related to offshore energy production were awarded. The first went to Shapoorji Pallonji Energy for the design of a large, next-generation floating production and storage unit (FPSO) featuring flexible mooring configurations, 60 risers, a 250,000 barrels (bbl) per day production capability and a storage capacity of 2.2 million (MM) bbl. The second AIP was awarded to Bumi Armada for the design of an innovative floating liquefied natural gas (LNG) facility that incorporates a barge-based liquefaction unit and existing LNG carriers for storage.

LEADING OFFSHORE WIND DEVELOPMENT

ABS has been a global leader in supporting the rapid expansion of the offshore wind industry from its inception. The organization has positioned itself to provide industry-leading guidance and support in all areas of offshore wind development.

ABS' place in the world of offshore wind was underscored by the standing-room-only attendance at the ABS Fourth Annual Offshore Wind Forum, held in New Orleans, Louisiana in November. The event, themed *Exploring Synergies and Innovation*, drew key offshore wind stakeholders from around the world for in-depth briefings on inconsistent regulatory policies, limited skilled labor pools, market developments, financing obstacles and more challenges facing the growing industry.

As the turbines used in floating wind farms grow in power, they also grow in size and weight, which places increasingly higher demands on their foundation structures. In January, ABS awarded AIP to Basso Technology for the novel design of a floating wind foundation capable of supporting 15- megawatt (MW) turbines, which are currently the world's largest turbines and weigh upwards of 2,000 tons. Named the *D-Floater*, it is to be a three-column semisubmersible unit design so that the foundations can be stacked inside one another for transport, allowing at least five complete foundations to be hauled to the wind farm in one heavy lift vessel.



© Basso Technology

In October, another AIP in this technology area was awarded to ECO TLP and MOcean-Offshore for the design of the ECO TLP foundation, which uses slip-formed cylindrical concrete hulls and gravity anchors combined with a tension leg platform (TLP) mooring system to offer a smaller foundation footprint than traditional steel column-stabilized units.

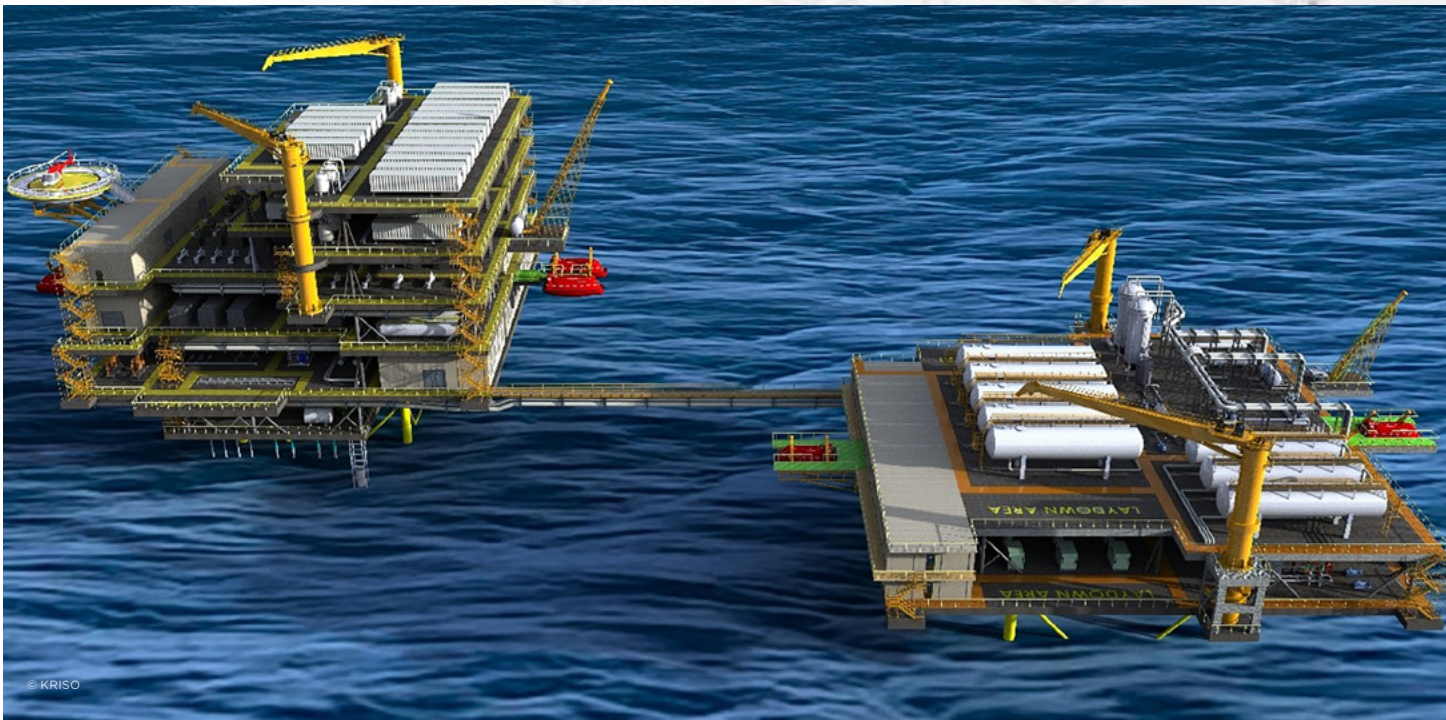
Offshore wind has a key part to play in the global energy transition beyond delivering clean energy for onshore applications. ABS approved a Korea Research Institute of Ships and Ocean Engineering design for a novel offshore platform for hydrogen and ammonia production. The platform, using energy generated by an offshore wind farm, will desalinate seawater, electrolyze it and compress the hydrogen it produces. The design also includes a system that separates nitrogen from air and then combines that with the produced hydrogen to generate ammonia.



SPOTLIGHT

ABS GUIDE FOR OFFSHORE ELECTRIC SUBSTATIONS IS FIRST TO COVER FLOATING WIND

In July, ABS published the industry's first requirements on safety and technical standards for floating offshore wind substations. Together with input from offshore wind project developers, original equipment manufacturers for substations and transportation and installation companies, ABS developed its *Requirements for Offshore Substations and Electrical Service Platforms* to address not only the needs of fixed-bottom substations but also new needs arising as floating wind projects around the world grow in size. A leader in the growing field of floating offshore wind, ABS has already been instrumental in the formulation of global standards for offshore wind platforms, notably working with the International Electrical Commission (IEC) on the design and fabrication of floating wind installations.



LEADING THE INDUSTRY TOWARD A SUSTAINABLE FUTURE

One essential part of maintaining safety leadership in the changing world of offshore energy is keeping far-future goals in focus and using that awareness to guide near-future technology development. Three notable successes from 2023 illustrate how ABS is fostering the offshore industry's role in a lower-carbon future.

In April, ABS released another of its industry-leading reports delving into the trends, tools, expectations and realities surrounding emissions reduction, decarbonization and sustainability. The *ABS Offshore Sustainability Insights* publication examines the pressures placed on the offshore energy community to improve its carbon footprint. It assesses the effects of decarbonization on offshore projects, explores market trends and considers challenges associated with implementing enhanced sustainability measures.

Following this publication, in May, ABS and several industry leaders in South Korea signed a memorandum of understanding (MOU) to produce a feasibility study on a near-shore floating platform for green hydrogen production and liquefaction as part of South Korea's drive to increase its energy self-sufficiency. In partnership with the Korea Institute of Energy Technology, Korea Shipbuilding and Offshore Engineering (KSOE) and Linde Korea, ABS continued its pioneering work in helping green hydrogen production develop into a commercial reality.

In June, ABS awarded a new technology qualification (NTQ) to NOV Subsea Production Systems for the prototype version of its revolutionary new subsea ammonia storage technology. The 200 cubic meter (m³) prototype is part of a JDP between ABS, NOV, Equinor, the Research Council of Norway and the Net Zero Technology Centre, which united to introduce unique new solutions for safe subsea containment of ammonia, e-fuels, enhanced oil recovery chemicals and other hazardous fluids necessary to global decarbonization.

In November, ABS announced sustainability reporting work completed with a leading OSV operator. ABS specialists have been working with Edison Chouest Offshore (ECO) since 2022, providing a gap analysis for the ECO Environmental, Social, and Governance (ESG) report using the Global Reporting Initiative (GRI) framework. This led to a full sustainability reporting project in 2023, where ABS supplied technical guidance on the GRI framework, a comprehensive materiality assessment, report writing and graphic design.



GLOBAL GOVERNMENT

SUPPORTING THE US GOVERNMENT

ABS maintains a unique and varied relationship with the United States (U.S.) government. By statute, ABS is designated as the sole agent in classifying vessels owned by the U.S. government. ABS is an important partner of the U.S. Coast Guard (USCG), serving as a Recognized Organization (RO) supporting the USCG mission for safety, security and environmental protection. U.S. government agencies rely on ABS for class-related and other technical analyses and advisory services related to their fleet operations. Additionally, ABS is a leader in supporting a wide range of agencies in contract research and development (R&D) work under grants and cooperative agreements. This R&D work covers traditional marine engineering topics as well as other areas, such as clean energy development in the maritime domain, maritime decarbonization, cybersecurity for vessels and port facilities, advanced manufacturing technology.

The relationship between ABS and the U.S. government was highlighted by several noteworthy projects in 2023. ABS was honored with the Coast Guard Foundation Award for recognition of support and commitment to the USCG. Additionally, ABS received the 2023 Secretary of Defense Employer Support Freedom Award, the highest recognition given by the U.S. Department of Defense to civilian employers for support of the U.S. National Guard and Reserve members.

GOVERNMENT FLEET SUPPORT

U.S. Military Sealift Command (MSC) has one of the largest ABS-classed fleets in the world. In 2023, ABS continued to innovate with MSC on condition-based class programs and cybersecurity notations for government vessels to meet U.S. Navy requirements. ABS successfully enrolled 13 MSC vessels into the condition-based class program, which provides maintenance planning and monitoring for enhanced life-cycle sustainment. ABS also provided critical cybersecurity support to the MSC fleet, achieving several Authority to Operate (ATO) certifications for several operational technology (OT) systems. ABS also entered into a new Defense Technical Information Center contract as a major partner to a government prime contractor for providing innovative solution support for MSC in areas such as digital twin development, service life extension planning, reliability analysis and advanced condition monitoring, remote survey and inspection, predictive models and edge analytics, among other topics.



SAFETY LEADERSHIP FOR A CHANGING WORLD

In 2023, Naval Sea Systems Command (NAVSEA) established a broad, multiyear sole source contract for *Technical and Engineering Support Services for Ships and Ship Systems in Ship Design, Engineering, and Integration Support Technical Area*. This contract provides a basis for expanded support from ABS to the U.S. Navy for classification, class-related, certification, life-cycle support and technical advisory services across several programs and classes of maritime assets and systems. The contract provides direct access to ABS for Navy Ship Design Managers, Technical Warrant Holders and many other organizations. Under this new contract, the U.S. Navy has already engaged ABS in multiple new ship design and construction programs and has allowed other agencies such as Special Operations Command to engage with ABS on its next generation of dry combat submersibles. The contract represents a major expansion of the working relationship between ABS and the U.S. Navy, in addition to other ongoing work with various classes of unmanned surface vehicles (USVs) and classification support to shipyards building John Lewis-class future fleet replenishment ships, Expeditionary Sea Base (ESB), Expeditionary Fast Transports (EPF) and the new Ocean Surveillance Ships.

ABS' support for the USCG in 2023 focused on class and class-related services including the USCG's Polar Security Cutter construction program, the Offshore Patrol Vessel construction program and the new Waterways Commerce Cutter construction program. ABS also continued to provide support for additional construction of the successful Fast Response Cutters for USCG and Foreign Military Sales programs with other nations. In March, the USCG renewed and expanded the scope of a long-standing technical services mechanism by issuing a new multiyear contract to ABS for the provision of classification and class-related services to vessel acquisition and sustainment programs.

With the U.S. Maritime Administration (MARAD), ABS continued to provide class and class-related services for Strategic Sealift vessels and the Ready Reserve Fleet. The highlight of the year with MARAD was the delivery of the first National Security Multi-Mission Vessel (NSMV) under ABS Class. ABS is classing all of the vessels in the program as MARAD recapitalizes the maritime school fleet. ABS also supported the Vessel Acquisition Manager program under which MARAD is purchasing used commercial vessels for the strategic sealift mission.



ABS continued to provide class and class-related services for the National Oceanic and Atmospheric Administration (NOAA) fleet. ABS assisted NOAA with cybersecurity assessments of its existing fleet and also worked with NOAA on the design and construction of two oceanographic monitoring ships, the *Oceanographer* and the *Discoverer*. Additionally, NOAA awarded the design and construction of a new class of research vessel in 2023, which includes vessels that will perform the ocean mapping and nautical charting mission supporting the Department of Commerce's role in enabling safe navigation of U.S. ports and harbors.

In addition to the above, ABS continued to provide class and class-related support to government fleets with the U.S. Army Corps of Engineers, the Army Watercraft Division and the U.S. National Science Foundation (NSF) University-National Oceanographic Laboratory System (UNOLS). A highlight of this support was the ABS Harsh Environment Technology Center and the Government Engineering Services division conducting preliminary design support and class services for the U.S. Army Corps of Engineers and the contracted design team on a barge that will be used as a floating pier for the U.S. Antarctic Program's McMurdo Station and operated by the NSF.

CONTRACT R&D SUPPORT

ABS R&D support for agencies falls into two categories: R&D related to clean energy and decarbonization in the maritime domain or other types of R&D related to ship and offshore asset design, construction and sustainment, including areas related to digital transformation in the maritime industry.

CLEAN ENERGY IN THE MARITIME DOMAIN AND MARITIME DECARBONIZATION

In 2023, ABS worked closely with academic institutions and government agencies to support clean energy development in the maritime domain. This included work on offshore wind development, support for marine energy device developers through the U.S. Department of Energy (DOE), and exploration of advanced nuclear applications in the maritime domain with the DOE. Some highlights of these activities include:

- Supported by the DOE and directed by the Pacific Ocean Energy Trust, the U.S. Testing Expertise and Access to Marine Energy Research (TEAMER) program accelerates the viability of marine renewables by providing access to the nation's best facilities and expertise. ABS was selected to support two projects by providing engineering analysis, numerical modeling and Computational Fluid Dynamics (CFD) simulations. ABS will provide key support in the design and testing of current and wave energy technologies with Hydrokinetic Energy Corporation and University of Hawaii, respectively.
- ABS provided technical, engineering and class services to the University of California, San Diego's Scripps Institution of Oceanography hydrogen-powered fuel cell program. The project represents the pioneering development of hydrogen as a marine fuel technology and supports the maritime research activities of the UNOLS.

The National Academy of Sciences Gulf Research Program awarded ABS two R&D projects. A key objective of one project is to investigate, create and evaluate a methodology to help integrate safety culture-related assessment activities into an organization's safety and environmental management system. The aim is to improve organizational culture and reduce management system failures, near-misses and incidents. In the other project, ABS will perform a scoping study that will identify and examine the anticipated challenges to today's offshore safety management framework caused by the energy transition initiatives (e.g., clean energy production, carbon capture and storage and decarbonization of marine and offshore operations) coming to the Gulf of Mexico.

Throughout the year, ABS was active in supporting the development of green shipping corridors. ABS led government engagement and funding opportunity applications to support implementation activities. ABS also supported progressive engagements for six proposed green shipping corridors focused on the decarbonization of the maritime industry through route and region-specific vessel and port operations:

- C40 Cities Green Digital Shipping Corridor – Singapore, Los Angeles/Long Beach, California
- Gulf of Mexico (GOM) GSC – Houston, Texas, New Orleans, Louisiana

- Antwerp-Bruges to Houston (AB-H) GSC
- Caribbean GSC
- Great Lakes GSC
- Pacific Northwest (PNW) GSC – Seattle, Washington, Alaska

ABS provided technical guidance and supported the California Air Research Board (CARB) during its implementation of the amended Commercial Harbor Craft (CHC) Regulation. ABS led a feasibility study to assess technical requirements of the regulations. In addition, ABS developed key industry engagement mechanisms to support program compliance.

ABS led the MARAD Feasibility Study on Future Energy Options for CHC in California to evaluate alternative fuel options, current and future power options and map the availability and implementation timeline for energy options with short-term (until 2030), medium-term (2030–2040), and long-term (2040–2050) outlooks. All aspects of these energy options were evaluated against their current and future benefits and barriers in order to establish a baseline projection of feasible and practical emission reductions and energy efficiency improvements.

ABS worked with the Great Lakes Carriers Association, Great Lakes Towing and other members of the Great Lakes maritime industry to develop a profile of shipping operations. The project was in partnership with the International Council on Clean Transportation (ICCT) and the Conference of Great Lakes and St. Lawrence Governors and Premiers (GSGP). The project assessed the future alternative fuels and power options that could be used to reduce air pollution and greenhouse gas (GHG) emissions from Great Lakes shipping.

R&D RELATED TO SHIP DESIGN, CONSTRUCTION AND SUSTAINMENT

ABS supported scientific research involving more efficient and effective ship design, construction, and sustainment.

- The National Shipbuilding Research Program (NSRP) awarded a Contracted Research & Development project entitled *Digital Twin “TRUST” Verification & Validation (V&V) Guide for Ship Design, Construction, Delivery and Sustainment*. This project proposes to develop and demonstrate verification and validation guidance that government agencies and the shipbuilding and ship repair industry can use jointly and collaboratively to establish trust in the wide range of technologies and applications often referred to as digital twins. ABS was also awarded other NSRP projects related to ship design optimization, qualification of additive manufacturing (AM) demonstrations, digital rules and verification of marine system technology.
- The National Institute for Occupational Safety and Health (NIOSH) awarded ABS an R&D project to develop a novel de-icing technology for commercial fishing vessels operating in cold regions. The aim is to mitigate the safety risks associated with various icing effects.

SUPPORTING INTERNATIONAL GOVERNMENTS

ABS is also very active internationally with support for foreign government fleets and with international R&D programs.

INTERNATIONAL GOVERNMENT FLEET SUPPORT

In 2023, the Canadian Coast Guard (CCG) exercised its option to extend its Delegated Statutory Inspection Program (DSIP) contract with ABS through 2028. Of the 124 CCG assets of length 12 meters or greater, 119 are enrolled in DSIP with ABS. Further, 29 of the largest ships are fully in class with ABS. Also in 2023, the CCG awarded ABS a contract to support CCG's efforts in the acquisition of its first PC2 Polar Icebreaker at Seaspan Shipyard in Vancouver. Under this three-year contract, ABS harsh environment and ice operations subject matter experts will provide ship design advice and guidance.

ABS continued to support the Royal Canadian Navy in the fifth year of the 35-year Non-Combatant Classification Society Services contract. Of the 78 assets that ABS has oversight, 15 are fully in class. Highlights for 2023 included:

- Two additional Harry DeWolf-class arctic offshore patrol vessels were delivered to ABS Class. Three of six planned vessels are in ABS Class while the fourth conducted ABS Class consideration review in 2023.
- Two of the four large naval tugs being built to ABS Class by Groupe Ocean were finalized for delivery as 2023 closed.

For Transport Canada, ABS was awarded tasks to evaluate the need for and ultimately propose solutions for correction factors to the International Maritime Organization (IMO) Carbon Intensity Indicator (CII) calculation methodology for the Canadian domestic fleet. The Canadian fleet faces many unique factors, particularly on the Great Lakes where self-unloaders are common. These vessels are characterized by short transits times, operating through many locks and often unloading at minimal infrastructure facilities.

Additional international government support was provided to the Maritime Squadron of the Armed Forces of Malta and the Indian Navy, where ABS provided construction and delivery support and engineering and class services, respectively, leading to the successful commissioning of the Malta Armed Forces P71 Patrol Boat and the keel laying of two Indian Navy multi-purpose vessels (MPVs).

INTERNATIONAL CONTRACT R&D SUPPORT

ABS, through its growing subsidiary ABS Canada Inc., continued to support both the Canadian federal and provincial government maritime fleets. In addition, ABS assisted Transport Canada's regulation and policy development groups to advance Canada's mandate of protecting the environment and safeguarding life in alignment with the ABS mission.

ABS also supported several significant R&D projects in Singapore in 2023. These projects involved emerging maritime technologies.

- The Maritime and Port Authority (MPA) of Singapore awarded a project to ABS that aims to develop an integrated modeling and simulation platform to harmonize data communication, model exchange and co-simulation among tools and software developed or used by Maritime Centers of Excellence (COEs) in Singapore. This would enable effective multidomain simulations and concurrent interoperable modular development, which is necessary to address various challenging problems in all aspects of the maritime value chain.
- ABS continued its work with Singapore Maritime Institute (SMI) and Singapore University of Technology and Design (SUTD) on developing the Maritime Testbed of Shipboard OT (MariOT) Systems for cybersecurity research, training, exercise and education. ABS is leading the development of virtual simulation models for the project, which aims to create a maritime testbed of shipboard operational technology (OT) systems and the ship-shore interfaces for cybersecurity research, training, exercise and education.
- The National Additive Manufacturing Innovation Cluster (NAMIC) of Singapore has awarded a project to support the fabrication of a propeller using AM technology. Mecast Marine, owner and manufacturer of propulsion system components, will be collaborating with the Singapore University of Science and Technology to build the propeller using Wire Arc Additive Manufacturing (WAAM) technology. ABS is a key partner in this project, supporting the approvals using ABS *Requirements for Additive Manufacturing* and other relevant class Rules to achieve its first class-approved ship propeller.

ABS also assisted several noteworthy R&D projects in Europe in 2023. ABS performed six sustainability studies and activities for the European Maritime Safety Agency (EMSA) on alternative fuels and power sources. Similarly, ABS conducted R&D under the Horizon Europe program, which is the European Union's (EU) key mechanism for tackling climate change, helping to achieve the United Nations' (U.N.) Sustainable Development Goals (SDGs) and boosting the EU's competitiveness and growth. These projects ranged from reviewing safety standards for the management of communicable diseases on board cruise ships, reviewing design methodology for technology related to storage and transportation of high-volume ammonia as fuel for ships and reviewing containment systems for liquid hydrogen long-term storage and long-distance transportation for commercial vessels.

DEVELOPING THE TALENT PIPELINE

The pace of change in the workplace continually tests ABS' ability to ensure that the organization's workforce is equipped to take on the challenges ahead. In this rapid evolution of technology, ABS remains well-positioned as a technical and safety leader. The core engineering and technology competence of ABS' people and the wealth of experience they bring to problem-solving is a key differentiator for the organization. Problem solving and critical thinking are key points of emphasis in ABS' career development planning.

That's why ABS is focused on continuing to develop the organization's employee base to be best in class through continuous learning, training and preparation to support the business' commitment to set standards of excellence as a leader in maritime safety – now and in the future. In order to do this, ABS constantly considers how to enhance employees' skills in areas like learning agility and developing a growth mindset. Both of those skills help unlock future potential for learning and growth in employees.

The path forward for ABS is clear based on three defining goals – safety, service and solutions. The organization has been able to achieve those goals through innovative thinking and the ability, drive and commitment of highly experienced employees. The ABS team remains committed to the company's mission, and the SPIRIT of ABS, which stands for Safety, People, Integrity, Reliability, Innovation and Teamwork, underpinned by Quality, and is the core of everything ABS does from a career development standpoint.

As an organization committed to investing in and cultivating a sustainable, diverse, multiskilled talent pipeline across a broad range of disciplines – traditional marine and offshore architecture, engineering studies, computer science, data analytics, sustainability and digital transformation – ABS is well-prepared and ready to meet the challenges of an evolving industry.

ABS' robust internal career development efforts are aligned to best practices and designed to provide a balance of development activities for employees, using a combination of job experience, mentoring, coaching and formal training.

TRAINING

In 2023, ABS continued to expand its learning capabilities. More than 160,000 formal training hours were completed by ABS employees during the year as they continued to develop skills for the future in topics such as emerging technologies, cyber resilience and goal-based standards. Nearly 60 percent of these completed training hours were focused on ABS surveyors, engineers and auditors obtaining new qualifications core to ABS client services.

The Gas Carriers qualification program is one such example. Nearly 200 ABS surveyors visited the newly opened ABS LNG Academy in Doha, Qatar, to attend the program's final capstone workshop. The LNG Academy also held its first client training in November, the LNG Commercial Operations course held in conjunction with Poten & Partners.



A robust catalog of training programs relating to gas carriers was made available through the LNG Academy and other ABS Academy locations in Houston, Athens, Busan, Singapore and Shanghai. The alternative fuels offerings also expanded to include ammonia as a marine fuel in addition to the previously available courses covering LNG and methanol fuel alternatives.

CAREER DEVELOPMENT

ABS offers employees two award-winning career development programs that are supported throughout the enterprise with great encouragement by the management team. These two programs, originally introduced in 2020, were refreshed in 2023, ensuring that employees can access the most current tools and resources that support their growth.

The Beacon Career Development Program launched a new “Open Enrollment” series of learning modules in 2023, focusing on skill building in six specific areas. The modules, which included web-based training, peer-to-peer learning and applied learning in their own work settings, attracted more than 270 participants during the inaugural year of this program. In addition, with the relaunch of Beacon in 2023, traffic to ABS’ internal careers pages was up more than 200 percent year over year from 2022.

The award-winning Propel Accelerated Leadership Development Program continues to thrive with more than 70 new participants added in 2023. Propel offers tailored development opportunities for identified high potential employees. As of year-end 2023, more than 250 high potential employees from around the world have expanded their careers and capabilities through targeted assignments, projects and trainings delivered as part of the Propel program.

New for 2023 was a Senior Leadership program launched in partnership with the Texas A&M Mays School of Business Executive Education center. The program is a two-week intensive program for senior level leaders to learn in an academic setting from top-tier academics and professionals. Seventeen high-potential leaders at the director, vice president and senior vice president level participated in this program during the inaugural year.

Also launched in 2023 was the Management Accelerator program, a program specifically designed for individuals who have recently made the transition from individual contributor to first line supervisors and managers. Participants in this six-month program met weekly to discuss topics around management and leadership, including two, in-person training weeks to cover communications skills and leadership as a new manager. More than 50 participants across the globe participated in programs that were based in Houston, Piraeus and Shanghai.

ASPIRE PROGRAM

The Aspire program is an 11-month rotational trainee program for new employees who are new graduates in the areas of naval architecture/marine engineering, mechanical engineering, structural engineering, electrical engineering, data analytics, computer science and related disciplines. The Aspire program provides participants with a unique, holistic understanding of ABS’ core operational areas. Placement into the business after the program aligns the participants with their career interests and the company’s business needs. Since Aspire’s founding in 2014, 162 early career professionals have been hired into the program, including the cohort that started work in July 2023. Placements in 2023 of recent Aspire graduates included five expatriate placements to roles in Dubai and China as marine surveyors. Aspire alumni who are currently in the ABS workforce are more than four times more likely than the organization’s general population to be identified as high potential future leaders. As such, Aspire has become the company’s “early careers-early talent” pipeline.

UNIVERSITY RELATIONS

In 2023, ABS continued its commitment to advancing education and research through ongoing global university engagements and partnerships.

UNIVERSITY RESEARCH

ABS and Texas A&M University expanded their unique global strategic relationship with a \$2.5 million (M) donation to endow the Ocean Engineering Department Chair and fund a new ABS Laboratory for Ocean Innovation.

In 2023, ABS also continued its engagement with Texas A&M Qatar where extensive research was completed regarding the application of carbon capture technology and its role in the marine sector. The study considered a process systems engineering based approach to enable the marine transportation system to operate taking into account restrictions in carbon emissions. To lay the foundation of this initiative, the team developed a framework considering the design and operation of ships and their supply chains as part of a decarbonized energy system.

ABS SCHOLARS

ABS continued supporting student success by committing \$1.2M in scholarships to more than 45 universities and maritime academies worldwide.

ABS scholars are university students who have demonstrated academic excellence and exemplary leadership qualities throughout their academic career. Additional candidacy for an ABS scholarship includes pursuit of a degree in relevant engineering and/or computer science discipline.

ON-CAMPUS ENGAGEMENT

ABS continues to maintain a strong on-campus presence with partnered universities and academies. Throughout 2023, ABS participated in more than 40 on-campus events, ranging from career fairs, information sessions, technical presentations, capstone competitions and receptions. These engagements emphasized ABS' leading role in sustainability and the green energy transition, organizational longevity and stability, its expansive career opportunities and more.

ABS has nine standing endowments at eight institutions. ABS Chairs support connecting ABS to top talent, exposure to research opportunities and driving innovative collaborations.

- ABS Chair of Naval Architecture and Marine Engineering and ABS Chair of Marine Transportation at the State University of New York (SUNY) Maritime College
- ABS Chair of Engineering at the California State University Maritime Academy (Cal Maritime)
- ABS Chair of Metallurgical and Materials Engineering at the Colorado School of Mines
- ABS Chair of Ocean Engineering at the University of California Berkeley (UC Berkeley)
- ABS Chair of Marine and Offshore Design Performance at the University of Michigan
- ABS Career Development Chair at the Massachusetts Institute of Technology (MIT)
- ABS Chair of Naval Architecture and Marine Engineering at the Webb Institute
- ABS Chair of Ocean Engineering at Texas A&M University

ABS ESG

ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) EXCELLENCE

A sustainable future is an integral part of the ABS mission. For the marine and offshore industries, the key to sustainable success is strategic alignment with the United Nations' (U.N.) Sustainability Development Goals (SDGs) framework – focused on achieving environmental, social and governance (ESG) excellence. That's why, in 2023, ABS published its second ESG report, continuing a consolidated method of sustainability reporting launched in 2022. This report showcased the organization's commitment



to sustainability in all its operations and the way employees work at ABS across programs, tools and processes in areas of social responsibility, safety, environmental protection, diversity, equity, and inclusion (DE&I) and governance.

ABS' SUSTAINABILITY PRIORITIES

ABS' PEOPLE

The people at ABS are the organization's most valuable assets. ABS embraces DE&I as part of its commitment to global citizenship. The company engages with its personnel and provides them with clear career choices, as well as equal opportunities. The organization respects the rights of its people across the globe and together brings positive social benefits to the wider community.

HEALTH AND SAFETY

Ensuring the health and safety of ABS personnel is a top priority. ABS established its own safety management system and a comprehensive monitoring mechanism to achieve enhanced safety performance. The organization actively identifies safety hazards and risks in the workspace and creates initiatives to mitigate those risks in order to reduce the number of incidents. In 2023, our safety theme was "SafetyPresent," a program dedicated to mental focus and monitoring changes in behaviors and conditions in the immediate environment, in addition to recognizing how these behaviors and conditions may change over time while completing tasks or migrating to different areas. The primary focus of this program in 2023 was related to critical safety behaviors identified within ABS. In 2023, ABS saw a 10 percent reduction in total recordable injuries (TRI), a 54 percent reduction in the lost time incident rate (LTIR) (one million hours) and a 33 percent reduction in the total injury rate (one million hours).

COMMUNITY ENGAGEMENT

ABS believes in being a responsible corporate citizen and playing an active role in the communities where it operates. As a multinational organization, ABS recognizes the importance of corporate social responsibility and actively engages in numerous local events, initiatives and community projects to make a positive impact on the lives of those around the business. Some examples include the United Way campaign in the United States, the ABS global scholarship program, volunteerism and charitable contributions. By working together, ABS can help ensure that the communities where employees live and work are vibrant and thriving places for generations to come.

GOVERNANCE AND INTEGRITY

ABS' reputation for ethical and reliable service is one of the organization's most important assets. This means employees must, at all times, operate with the highest level of integrity. The ABS Code of Ethics sets out the standards and practices that form the foundation for conduct. The organization's strong commitment to ethics and integrity is not just good for business — it is part of the fabric of what ABS is as an organization and as individuals. ABS clients trust the organization to be their partner, and employees trust one another to operate according to the highest standards of conduct. The same level of commitment to ABS values of diversity and inclusion, human rights and resource conservation is requested from suppliers and outlined in the organization's procurement policies. Commitment to ethics and integrity benefits ABS, its clients and the industry at large.

TECHNOLOGY AND INNOVATION

ABS is leading the way in supporting digitalization of the maritime industry. The company recognizes the importance of innovation and digitalization in driving energy efficiency and reaching long-term sustainability targets.

ENVIRONMENT

ABS is an industry leader in promoting environmental sustainability. The organization is committed to complying with all environmental laws and regulations in its global operating sites and reducing the environmental impact in its business practices. ABS' research and innovation provide solutions to clients for reducing their carbon footprint and achieving environmental compliance. To find more information on ABS ESG activities and performance, please download the 2023 ABS ESG Report. A copy of the report is available on the ABS website at www.eagle.org.



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ABS GROUP OF COMPANIES, INC.

SAFETY LEADERSHIP FOR A CHANGING WORLD: ADDRESSING THE EVOLVING RISKS OF CRITICAL INFRASTRUCTURE IN AN INTERCONNECTED AND DIGITAL WORLD

In 2023, ABS Group of Companies, Inc. (ABS Group) and its subsidiaries, which provide safety and risk consulting, certification, and risk management solutions across the Americas, Europe, Middle East and Asia Pacific regions, divested its former Technical, Inspection and Verification (TIV) business allowing ABS Group to focus its market strategy on providing continued and enhanced support to critical infrastructure for key industries including oil, gas and chemical, power and energy, industrial manufacturing, government, and marine and offshore.

In addition to providing robust risk management services across critical infrastructure, ABS Group remains committed to safety excellence internally, achieving an impressive safety milestone of zero work-related lost time incidents for the eighth consecutive year. ABS Group was also recognized by OrangeSlices AI as a 2024 Elev8 GovCon honoree for its work in the government space and surpassing industry standards in employee engagement, culture and customer involvement.

With over half a century of safety leadership, ABS Group continues to address the current risk landscape, including evergreen industry regulations, data-centered operations and the emergence of unexpected cyber and physical security risks to critical infrastructure. These challenges, underscored by the dynamic nature of a more interconnected and digital world, have pushed ABS Group to expand its portfolio and provide innovative safety solutions to the diverse industrial and government clients that power, fuel and regulate our world.

BUILDING A FOUNDATION OF SAFETY CULTURE: IMPLEMENTING INVALUABLE RISK MANAGEMENT SOLUTIONS

ABS Group's risk consulting subsidiary, ABSG Consulting Inc. (ABS Consulting) has developed a unique and holistic approach to risk management based on decades of industry-wide experience that considers the total risk picture. ABS Consulting's data-driven risk and reliability solutions cater to clients' unique needs, ultimately helping them create a safety culture that becomes an inherent part of the organization.



SUPPORTING COMPANY-WIDE TRANSFORMATIONS WITH SAFETY MANAGEMENT SYSTEMS FOR LONGSTANDING SUCCESS

In recent years, the National Transportation Safety Board (NTSB) has renewed its efforts to improve passenger vessel safety requirements, prompting all passenger vessels to consider reevaluating their safety programs and procedures to ensure relevant and all-encompassing protocols govern their vessels, offices, facilities and anywhere else they may do business. This can be accomplished by developing a strong Safety Management System (SMS), which provides a framework for minimizing risks related to safety, security and environmental dangers at every level of an organization.

ABS Consulting's robust history of providing risk management solutions to the maritime industry has positioned the organization as an SMS expert, with the capability to seamlessly conduct and support company-wide safety transformations for longstanding success.

BUSINESS EXCELLENCE: IMPLEMENTING ISO CERTIFICATIONS FOR CONTINUOUS IMPROVEMENT

For more than 30 years, accredited quality and business assurance auditors at ABS Quality Evaluations, Inc. (ABS QE), the management systems certification subsidiary of ABS Group, have supported companies around the world, providing management system certification, verification, assessment and training services to help them better assure reliable performance of business, systems, people and supply chains. International Organization for Standardization (ISO) certification and industry-led standards establish credibility and trust among stakeholders, including consumers, clients and business partners.

SPOTLIGHT

ABS CONSULTING HOSTS INAUGURAL LIFE SCIENCES MAXIMO SUMMIT ADDRESSING ASSET MANAGEMENT STRATEGIES

In 2023, ABS Consulting hosted key industry players during the company's inaugural Life Sciences Maximo Summit. The event convened representatives in the life sciences space to explore best practices on the implementation and use of IBM Maximo's software solutions. This exclusive event kicked off with experts from ABS Consulting addressing the importance of proactive asset management in the life sciences industry. Attendees were given the opportunity to share their experiences utilizing the software directly with IBM representatives in attendance, providing feedback for various capabilities, including auditing, enhanced mobility and reporting, and change management.



“As part of our industry-leading risk management services, ABS Consulting aims to deliver solutions that optimize asset management strategies and streamline operations for improved ROI,” said Ryan Moody, President and CEO of ABS Consulting. “The event was a great success and helped identify and accelerate improvements specifically aimed at the needs of the life sciences industry.”

ABS QE's comprehensive solutions support a continuous journey of operational improvement and help better prepare organizations for a successful future. In 2023, ABS QE expanded its services for sustainability, corporate social responsibility (CSR) and cybersecurity, as well as its global reach in several markets, including aerospace, automotive, infrastructure and chemical.

Key organizations certified in 2023 by ABS QE include: Chile supply chain, storage and transportation company Servicios Maritimos y Portuarios for ISO 9001:2015 Quality Management System, ISO 14001:2015 Environmental Management System, and ISO 45001:2018 Occupational Health and Safety Management System; Neuman Aluminium Raufoss Mexico for IATF 16949 Automotive Quality Management System; Vedacit, a Brazilian company specializing in products and solutions for civil construction, for ISO 9001:2015 Quality Management System; and L35 Arquitectos in Spain for ISO 19650:2018 Building Information Modeling (BIM).

SUPPORTING THE LIFE CYCLE OF CRITICAL INFRASTRUCTURE INDUSTRY-WIDE

With many essential services handled by private entities in coordination with federal and local agencies, critical infrastructure leaders understand the importance of uninterrupted operations from capital expenditures (capex) to operating expenses (opex). ABS Consulting supports the asset life-cycle journey, addressing both catastrophic and operational risks with critical services, including structural integrity management (SIM), risk-based inspections (RBI), due diligence, mechanical integrity (MI) and asset integrity management (AIM).

MAXIMIZING THE VALUE OF OPERATING ASSETS

As a leader in the application of advanced technology, analysis and modeling of complex engineering projects, ABS Consulting provides SIM services, including RBI, that help improve operational efficiency, reduce risk, increase asset reliability and assist clients in understanding asset conditions in support of operational and investment decision-making.

In 2023, ABS Consulting, alongside ABS, was selected by MISC (a global leader in delivering energy-related maritime solutions and services) to help them develop, implement and sustain an effective and optimized structural integrity program to help reduce asset opex costs and technical risks while maintaining increased asset reliability and availability. To achieve this goal, MISC entrusted ABS Group and ABS to provide its Floating Asset Technical Services, including RBI Plan development and management as well as additional engineering services.



MI and AIM programs have proven to be one of the most difficult Process Safety Management (PSM) elements and plant activities to effectively develop and implement. In 2023, ABS Consulting provided MI Program Development for several organizations, including INEOS Styrolution America, a leading global styrenics supplier; Ashland Inc., a premier specialty materials company; Pluspetrol, the leading private oil and gas company in Latin America; and Pro Petroleum, one of the fastest growing, independent petroleum companies in the Western United States.

FROM PAPER TO PROJECT: THE JOURNEY TO OPERATIONAL SUCCESS

Utilizing its comprehensive expertise in market analysis, project management and third-party inspection, ABS Consulting offered clients a distinctive approach to help safeguard their financial investments, optimize returns and drive efficient project execution. Due diligence plays a vital role in the risk mitigation process and should be integrated across the plan, design, build and operational life cycle of an asset. ABS Consulting's holistic three-step approach (1-Planning and Feasibility, 2-Designing, 3-Construction) assists stakeholders in mitigating capex risk in a more effective way, with specific services to support both lenders and development teams.

In 2023, ABS Consulting provided the National Bank of Greece with due diligence services for the Alexandroupolis Independent Natural Gas System Project. As the major financing party, the bank needed to clearly understand the project's development from a technical point of view to offer its financing services efficiently. ABS Consulting's role helped provide the bank a clear overarching picture of the project's status and progress. This allowed the National Bank of Greece to make decisions based on the most up-to-date information, protecting its interests throughout the project's life cycle and helping to avoid unnecessary delays and unjustified cost increases.

ADDRESSING EVERGREEN AND EMERGING REGULATIONS AS A LEADING SAFETY AND RISK MANAGEMENT ADVISOR

Standard industry regulations, in addition to emerging international standards for sustainability, remain a contributing factor to the difficulties of navigating the ever-changing risk landscape. ABS Consulting's proven Compliance Management services help increase safety and reliability, enhance efficiency and decrease risk. As regulations and standards change, ABS Consulting remains at the forefront of understanding how to address these changes that will affect its clients' operations as well as the specific challenges of facilities in the oil, gas, and chemical, and power sectors, among others.

SPOTLIGHT

ABS CONSULTING AND S&K MISSION SUPPORT KEY CONTRACTS FROM FEDERAL AGENCIES

ABS Consulting secured through its Tribal 8(a) Joint Venture Snow Eagle Group (SEG) with S&K Mission Support, a three-year, \$13.5M direct award contract to provide data governance services to the FEMA, which will help the agency move from using data in a reactive, rear-looking perspective to leveraging data as a strategic asset that enables strategic and forward-looking decision making.

In addition, SEG was awarded a contract with the Federal Transit Administration (FTA) to assist in administering the National Public Transportation Safety Program. SEG provides technical and policy support services to facilitate data and risk-based SMS processes, supporting the FTA's mission to help transit agencies identify, analyze and prioritize safety concerns.

SUPPORTING BETTER BUSINESS PRACTICES

CSR has gained importance on a global level, with industry-led certifications helping to pave a cohesive way for businesses to address pressing environmental, ethical and human rights responsibilities. American multinational retail corporation Walmart has become a driving force in the transition to third-party assessments of CSR best practices and certifications across its supply chain, with other major retailers following suit.

ABS QE continues to expand its auditing portfolio, providing key CSR certifications industry-wide, including SA8000 – Social Accountability Standard, BSCI – Business Social Compliance Initiative, Sedex Members Ethical Trade Audit (SMETA) and more.

In 2023, ABS QE performed 276 SA8000 audits, 59 SMETA/Sedex audits and 870 BSCI audits. In addition, ABS QE helped several clients achieve high levels of maturity in their social compliance management systems, including Clarios, a global leader in advanced low-voltage battery solutions; Hypertechnology, a software solutions provider; Fluence Energy, a market-leading energy storage products and services provider; and West Liberty, a public university in West Virginia.

ABS Consulting also provided California-based renewable energy company Global Clean Energy with AIM and reliability services to support its site transition from traditional fossil fuels to biofuel. Services included a reliability gap assessment, asset criticality and critical spares development, and Maximo implementation including data normalization, migration, integrations and training. The project was a success and was highlighted within IBM's internal national sellers' network during their quarterly broadcast.

SPOTLIGHT

ABS QE ACHIEVES AUTHORIZED CMMC CERTIFIED THIRD-PARTY ASSESSMENT ORGANIZATION (C3PAO) STATUS

In 2023, ABS QE announced its certification as a Cybersecurity Maturity Model Certification (CMMC) third-party assessor organization (C3PAO). This authorization enables ABS QE to conduct audits for Defense Industrial Base (DIB) businesses operating within critical infrastructure to help them better ensure that their cybersecurity practices will adequately protect controlled unclassified information (CUI). The achievement comes at a significant time in the DIB's pursuit of more stringent, standardized cybersecurity protections.

"The clock is ticking for DIB contractors seeking CMMC 2.0 compliance, and it's increasingly clear that companies need to start now to stay competitive in the market," said Dominic Townsend, President of ABS QE. "Our deep expertise in management systems, in addition to our cybersecurity competence, forms the base of our CMMC services, and our C3PAO status facilitates our efforts to help safeguard the nation's defense sector."



SPOTLIGHT

V. SELECTS ABSG CONSULTING TO DELIVER MAJOR SAFETY INITIATIVE ACROSS ONSHORE AND SEA OPERATIONS

V., a global ship management and marine services provider, selected ABS Consulting to deliver a major safety initiative across its onshore and at sea operations via a comprehensive Safety Assessment program. The Safety Assessment program analyzed V.'s robust processes and procedures related to the management, performance and sustained effectiveness of V.'s management systems (V.MS), with an emphasis on continuous improvement throughout.

“Our partnership with ABS Consulting supports our continuous drive for safety excellence, providing expert guidance towards the highest possible health, safety, security, environmental, and quality (HSSEQ) standards,” said René Kofod-Olsen, CEO of V. “The maritime industry is exposed to a unique set of risks that require complex management systems to support the wellbeing of personnel, stakeholders and assets.”

EXPERT GUIDANCE FOR INDUSTRY REGULATIONS

In 2023, ABS Consulting expanded its relationship with legacy client Westlake, a global manufacturer and supplier of materials and innovative products, providing vital solutions — from packaging and healthcare products to automotive and consumer goods to building and construction products. Originally hired for Facility Siting Studies, ABS Consulting built upon its initial service offering to provide PSM audits and MI services, including a two-phase Pressure Safety Valves (PSV) project, Flare Header Study and PSV information verification project.

Once again, ABS Consulting had success supporting Brazilian Regulatory Compliance (BRC) globally and continued to evolve its services to provide clients with effective regulatory compliance management by identifying the applicable regulations and their potential impact at each appropriate phase of the project, from initial design stages to detailed design, procurement, construction and commissioning.

Key projects included supporting Danish shipping and logistics company Maersk Supply by performing a BRC gap analysis for offshore support vessels (OSV) to operate in Brazil and providing FPSO — P-78 BRC compliance services, during feed, detailed design, procurement, construction and commissioning.

IMPLEMENTING NEW TECHNOLOGY, DATA AND TECHNIQUES FOR IMPROVED RISK MITIGATION

ABS Consulting remains at the forefront of industry innovation, investing in the development of cutting-edge technology and advanced data techniques to help its clients enhance operational efficiency while mitigating pressing risks. ABS Consulting's Product Development and Innovation (PD&I) Center continued to focus on the advancement of analytics and visualization for commercial and government clients worldwide.

In 2023, ABS Consulting embarked upon custom machine learning (ML) to extract critical spare part data out of PDF documents. This innovation began with a pilot project for a major multinational pharmaceutical corporation, utilizing ML for various sources, such as technical drawings and equipment manuals. Similar solutions were implemented to process steel mill test report documents and inspection reports for maritime-related applications.

ABS Consulting also continues to support the federal government in evaluating natural hazard risks and post-disaster loss analyses via the National Risk Index (NRI), created to support the Federal Emergency Management Agency (FEMA) in utilizing data to identify communities that are most vulnerable to natural disasters. ABS Consulting has expanded its expertise in community disaster resilience, conducting a

qualitative risk analysis (QRA) for the transport of liquefied natural gas (LNG) by rail and the correlating socially vulnerable populations. The results were presented at the Pipeline and Hazardous Materials Safety Administration (PHMSA) Research, Development and Technology (RD&T) Forum.

In 2023, ABS Consulting also announced the launch of its BRC Application to support the digitalization of compliance processes for streamlined efficiency. The app provides improved transparency throughout the compliance journey, ultimately enabling clients to have a more holistic view of actionable tasks for capex and opex investments.

IBM MAXIMO APPLICATION SUITE (MAS): UNDERSTANDING THE MARKET'S LEADING EAM SOLUTION

In 2023, ABS Consulting continued to provide global EAM implementation services for IBM Maximo, with a focus on supporting clients with the recent Maximo Application Suite (MAS) upgrade from the ground up. ABS Consulting's holistic approach to asset management, beginning with the evaluation of operations and strategy development, all the way to process and systems implementations, helped to solidify that organizations were successfully embracing the benefits of advancements in technology.

ABS Consulting was also awarded a competitive request for proposal (RFP) for the City of Fort Collins, Colorado, for a multiyear agreement. Services included: the implementation of a CMMS for multiple disciplines within the organization; warehouse data conversion, cleansing, normalization and configuration into Maximo CMMS; implementation of electrical distribution asset inspections; the design and build of work management process flows and implementation into Maximo CMMS and more.

A HOLISTIC APPROACH TO PHYSICAL AND CYBERSECURITY IN COMMERCIAL AND GOVERNMENT SPACES

ABS Consulting's extensive range of Physical Security Risk Management services provides bespoke solutions for unique problems. ABS Consulting works with a vast array of clients around the globe, using proven practical risk-based assessments to help them understand and reduce their risk profiles, optimize insurance expenditures, train personnel, and confirm compliance with existing and impending regulatory requirements.

In response to new requirements from Singapore's Infrastructure Protection Act, ABS Consulting hosted an exclusive seminar in Singapore, Practical Application of Security by Design for Buildings, in conjunction with Competent Person (CP) Blast experts, to address the unique challenges building owners and developers in the region face.

INDUSTRIAL CYBERSECURITY FOR CRITICAL INFRASTRUCTURE

Industrial cybersecurity remains crucial as the convergence of information technology (IT) and operational technology (OT) has become more prevalent, especially considering the growing import of critical infrastructure throughout the world. ABS Consulting continues to address this need by offering a comprehensive portfolio of OT cybersecurity consulting, implementation and risk management services.



SPOTLIGHT

ABS QE GRANTS REMUNERATION AUDIT CERTIFICATION TO TOYOTA SPAIN MAKING THE AUTOMAKER THE FIRST TO SATISFY NEW SPANIARD PAY GENDER EQUALITY REGULATIONS

ABS Quality Evaluations Spain (ABS QE Spain), delivered a Remuneration Audit Certification to Toyota Spain, signifying its commitment to gender equality. The new legislation on Equality Plans has a special emphasis on ensuring that in all companies with 50 or more workers, there is no salary discrimination on gender grounds. For this purpose, in addition to clarifying how the Retributive Registry must be carried out, it has included, as recently as in Royal Decree 902/2020, of October 13, of retributive equality between women and men, the obligation to carry out a Retributive Audit. The certificate, which recognizes the consistent application of equity-based policies, was granted after the Remuneration Audit was conducted, affirming that no gender pay inequality was found.



ABS Consulting and Dragos Inc. (Dragos), a global leader in cybersecurity for industrial controls systems, expanded their strategic partnership to provide industry-leading OT cybersecurity solutions, services and training to federal and commercial organizations. In 2023, ABS Consulting and Dragos began working together to support the U.S. Coast Guard (USCG), incorporating OT cyber threat information from Dragos' WorldView threat intelligence within the Maritime Security Risk Analysis Model (MSRAM) cyber module, replacing legacy Intelligence Coordination Center (ICC) cyber threat data.

ADVANCING CYBER RESILIENCE FOR SHIPS, PORTS AND TERMINALS: MARITIME DAY AT THE NAVY YARD

ABS Consulting hosted federal and industry stakeholders for the Maritime Transportation System (MTS) during the organization's first annual Maritime Day at the Navy Yard, created to help advance cyber resilience for ships, ports and terminals. Hosted in Washington, D.C., the event addressed cyber risks disrupting the maritime industry's ongoing digital transformation. Key topics included the increase of ransomware attacks on critical infrastructure, the vulnerable state of Information Control Systems (ICS) due to malware, and the risks unprotected OT networks face should supply chains become compromised or remote access be gained by adversaries.

The event was a success and participants walked away with specific knowledge about the tactics attackers are employing against the MTS and the recommended controls and regulations to better defend their operations, including how to build a secure cybersecurity ecosystem that supports 24/7 visibility and control of OT and ICS networks.

DELIVERING WORLD-CLASS RISK SOLUTIONS

As the world continues to change and critical infrastructure is faced with addressing emerging risks, including rapid developments in technology and an evolving regulatory landscape, ABS Group remains at the forefront of safety and risk management. Its priority in protecting critical infrastructure from risk is not only a matter of national security but also of protecting the health and safety of people globally. As new risks emerge, ABS Group will continue to add value to the key industry verticals of marine and offshore, oil, gas and chemical, government, power and energy, and industrial.

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ABS WAVESIGHT™

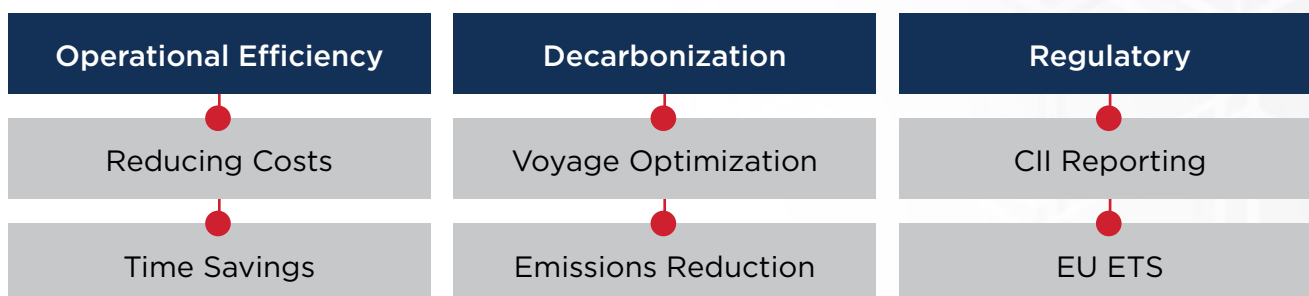
As the maritime industry continues to tackle the challenges and opportunities of digitalization and decarbonization, ABS Wavesight™ represents a steadfast commitment to enabling success on both journeys.

In 2023, ABS Wavesight celebrated a year since it was launched as the new brand for ABS Digital Solutions LLC. ABS Wavesight's entrance into a dynamic and competitive maritime technology segment was characterized by strategic foresight, relentless pursuit of excellence and a deep commitment to the company's core mission – developing world-class software products that improve vessel performance for the health of our seas, environment and self.

ABS WAVESIGHT™ CUTTING EDGE SOFTWARE PORTFOLIO

With an installation base of more than 5,000 vessels, across blue water, brown water and offshore markets, the ABS Wavesight software portfolio is actively contributing to the sustainable evolution of maritime operations worldwide and delivering significant client value. ABS Wavesight's integrated approach begins with an all-encompassing portfolio of software products. Nautical Systems covers all aspects of fleet management, including compliance, asset and workforce management. My Digital Fleet provides fleet optimization solutions that range from vessel performance to fuel efficiency, while eLogs simplifies and expedites recordkeeping.

ABS WAVESIGHT PORTFOLIO OUTCOMES



Delivering Measurable Client Value



More than
\$10 million
in savings



Fuel reduction of more than
12.3 metric tons (MT)
per voyage



CII grades increased
2-3 ratings



More than
50,000 MT
of CO₂ avoided

MY DIGITAL FLEET

In 2023, ABS Wavesight's priorities for My Digital Fleet were to address key market challenges in the areas of vessel monitoring, sustainability reporting and emissions tracking and viewability and security of data. In support of this, several key enhancements were released within the product, including a new Vessel Data Monitoring module to provide visibility into areas requiring corrective action. Other enhancements included regulatory support functionality to inform Carbon Intensity Indicator (CII), EU Emissions Trading System (EU ETS) allowances, FuelEU costs, and Poseidon Principles and Sea Cargo Charter performance. My Digital Fleet also received an updated interface for easier adoption and a streamlined user experience.

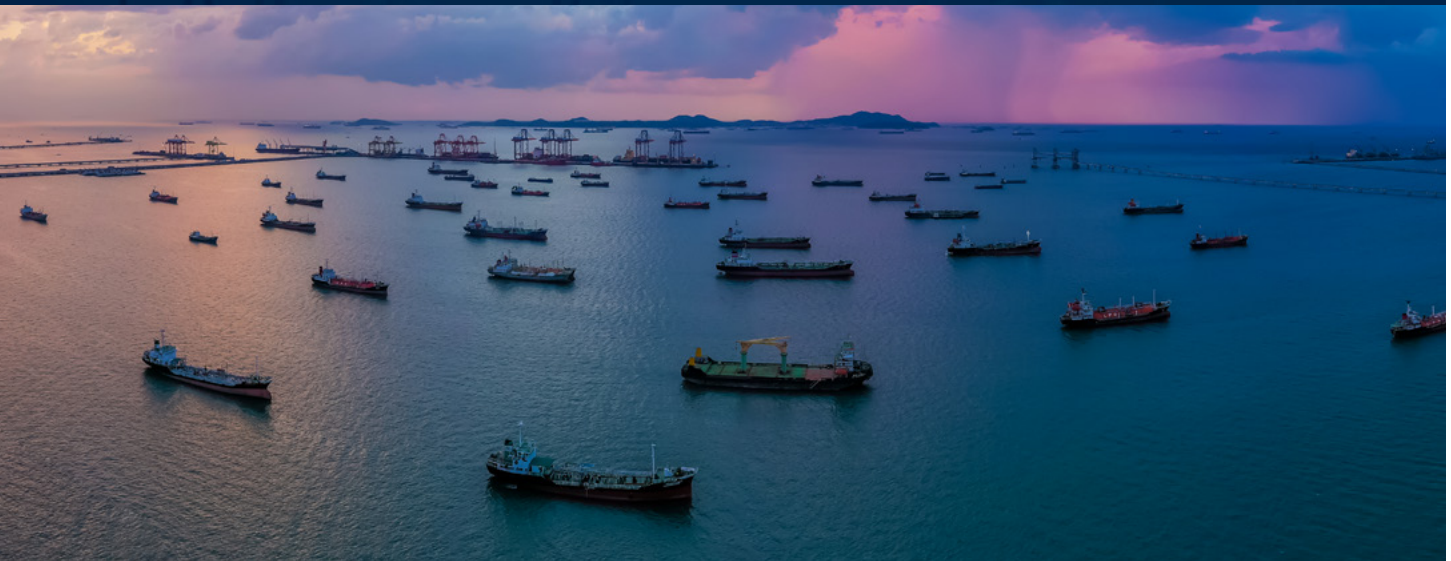
SPOTLIGHT

UNLOCKING MORE EFFICIENT FLEET OPERATIONS

In November, ABS Wavesight unveiled a tranche of updates to Nautical Systems that would unlock deep efficiencies in core fleet operations, streamline administration of maintenance tasks and enable more effective procurement. The new releases, along with updates to support compliance with upcoming regulations, were announced at the 23rd Nautical Systems Global User Conference.

For most ship operators, planning and executing maintenance is a complex interaction between scheduling, workload management and safety assessments, often spanning multiple digital systems. Among the updates announced in November was a new integration within Nautical Systems' Maintenance Manager module. The update enabled all maintenance-related processes to be managed from a single source. The integration, which delivers adaptive scheduling, predefined risk assessment templates and permit tracking through a single interface, will give greater visibility into maintenance planning and help crew to manage tasks safely and efficiently.

During the conference, the company also presented product roadmaps and new features, solicited customer feedback and collaborated with users to identify future areas for developing ABS Wavesight solutions.



SPOTLIGHT

USCG APPROVES ELOGS FOR US-FLAGGED SHIPS

Updates and enhancements delivered throughout 2023 helped ABS Wavesight's eLogs software receive United States Coast Guard (USCG) approval for use by U.S.-flagged ships in early 2024. The company is one of only three maritime software providers that has received such approval on the basis of the USCG's guidance under USCG NVIC 01-23. Throughout the approval process, ABS Wavesight worked with the USCG to ensure necessary criteria had been met. The software was developed pursuant to ISO/IEC 27001 standard, which is a well-established standard for information security management systems to protect data from cybersecurity threats.

NAUTICAL SYSTEMS

Over the past year, Nautical Systems was enhanced with more than 50 new releases, including over 100 new features addressing challenges in areas such as asset management, crew safety and vessel maintenance. Some of the new enhancements supporting these critical functions included updating the inventory control functionality within the Purchasing Manager module for avoidance of purchasing unauthorized and underperforming parts and creating the interoperability between Maintenance Manager and ABS Freedom™ to support digitalization of the survey process and compliance with the International Convention for the Safety of Life at Sea (SOLAS) regulation. Additionally, enhancements to the Nautical Systems HSQE and Vetting Manager module added the new SIRE 2.0 regulation functionality unlocking a fully digitalized and streamlined inspection process for owners.

ELOGS

eLogs is a powerful and reliable electronic logbook solution that simplifies recordkeeping and enhances compliance management for today's digital fleet. To assure compliance, in 2023, ABS Wavesight secured approvals from more than 20 flag States, with the most recent approval coming from the USCG. Additional enhancements made to eLogs included ensuring multi-instance accessibility for all users, across all environments. This helps reduce user errors, increase data quality and optimize digital recordkeeping. It also ensures the highest level of data security by achieving ISO/IEC 27001 certification and aligns with SOLAS, the BWM Convention and MEPC 80 standards.

Beyond the significant advancements made to ABS Wavesight's products, development of the company's identity meant the introduction of a brand that would enhance the ABS legacy and support its position as a leader in the marketplace. To that end, the ABS Wavesight brand was recognized by the American Marketing Association as best new brand. It also received the award for best website.

2023 was a testament to the resilience, creativity and unwavering dedication of the ABS Wavesight team members, partners and stakeholders who have collectively contributed to the organization's achievements – from groundbreaking advancements in technology to significant strides in environmental stewardship and community engagement.



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