İSTANBUL VE MARMARA, EGE, AKDENİZ, KARADENİZ BÖLGELERİ
DENİZ TİCARET ODASI
ISTANBUL & MARMARA, AEGEAN, MEDITERRANEAN, BLACKSEA REGIONS
CHAMBER OF SHIPPING

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Konu : Alternatif Denizcilik Yakıtlarına Yönelik Rehber Hk.

Sirküler No: 549

Sayın Üyemiz,

Bilindiği üzere, Uluslararası Denizcilik Örgütü (International Maritime Organization-IMO) ve Avrupa Birliği (AB) tarafından denizcilik sektöründen kaynaklanan emisyonları azaltmak için uluslararası alanda çeşitli düzenlemeler yapılmaktadır. IMO, 2030, 2040 ve 2050 yılları emisyon azaltım hedefleriyle net sıfır sera gazı emisyonuna ulaşmayı taahhüt ederken, AB'nin Avrupa Yeşil Mutabakatı kapsamında denizcilik sektörü için Emisyon Ticaret Sistemi ve yakıt vergilendirme düzenlemeleri yürürlüğe girmiştir.

Uluslararası ölçekte yaşanan bu süreçte, denizcilik sektörünün dekarbonizasyonuna yönelik çalışmalardan biri de denizcilik sektöründe teknolojik yenilik ve sıfır veya sıfıra yakın sera gazı emisyonlu teknolojilerin, yakıtların ve/veya enerji kaynaklarının oluşturulması, küresel düzeyde ticari olarak kullanılabilirliği ve sürdürülebilirliğinin artırılması ile kullanımının teşvik edilmesidir. Bu doğrultuda kısa vadede LNG, biyoyakıt gibi geçiş yakıtlarının, uzun vadede amonyak gibi sıfır emisyonlu yakıtların alternatif yakıtlar olarak kullanılması öngörülmektedir.

Bu kapsamda, alternatif yakıtlara ilişkin bilgilendirme faaliyetleri doğrultusunda Uluslararası Bunkerciler Birliği (International Bunker Industry Association-IBIA) tarafından hazırlanan Biyoyakıtlar ve BiyoLNG Sıkça Sorulan Sorular (SSS) Rehberleri, Odamızın 20.02.2025 tarih ve 134 No'lu sirküleri ile duyurulmuştur. Sektörün alternatif yakıtlara geçişini destekleme konusundaki kararlılığı çerçevesinde son olarak IBIA tarafından Amonyak hakkında SSS Rehberi yayımlanmıştır.

Gemi sahipleri, işletmecileri ve denizcilik profesyonelleri için IBIA Geleceğin Yakıtları Çalışma Grubu tarafından özel olarak hazırlanan rehber, amonyak ile ilgili tanımlar, sürdürülebilirlik standartları, uyumluluk ve teknik özellikler hakkında bilgiler içermekte olup Ek'te yer almaktadır.

Bilgilerinize arz ve rica ederim.

Saygılarımla,

e-imza
Muhammet Alper KEÇELİ
Genel Sekreter V.

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Ek: Amonyak-Sıkça Sorulan Sorular Rehberi (8 Sayfa)

Dağıtım:

Gereği:
- Tüm Üyeler (Odamız web sitesi ve e-posta ile)
- İMEAK DTO Şube ve Temsilcilikleri
- Türk Armatörler Birliği
- S.S. Armatörler Taşıma ve İşletme Kooperatifi
- GİSBİR (Türkiye Gemi İnşa Sanayicileri Birliği Derneği)
- Gemi, Yat ve Hizmetleri İhracatçıları Birliği
- VDAD (Vapur Donatanları ve Acenteleri Derneği)
-TÜRKLİM (Türkiye Liman İşletmecileri Derneği)
- KOSDER (Koster Armatörleri ve İşletmecileri Derneği)
- GBD (Gemi Brokerleri Derneği)
- ROFED (Kabotaj Hattı Ro-Ro ve Feribot İşletmecileri Derneği)
- Yalova Altınova Tersane Girişimcileri San.ve Tic.A.Ş.
- UTİKAD (Uluslararası Taşımacılık ve Lojistik Hizmet Üretenleri Derneği)
- GEMİMO (Gemi Makineleri İşletme Mühendisleri Odası)
- TMMOB GMO (Gemi Mühendisleri Odası)
- 13 ve 28 No'lu Meslek Komiteleri

Bilgi:
- Yönetim Kurulu Başkan ve Üyeleri
- İMEAK DTO Şube YK Başkanları
- İMEAK DTO Sürdürülebilirlik Komisyonu
- İMEAK DTO Meslek Komite Başkanları

IBIA

INTERNATIONAL BUNKER INDUSTRY ASSOCIATION

FAQs

Ammonia in the Shipping Sector

INTERNATIONAL BUNKER INDUSTRY ASSOCIATION

FAQs:

Ammonia in the Shipping Sector

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01. How is Ammonia produced and distributed for bunkering purposes?

The Haber-Bosch process is the most utilised production method for Ammonia. It is an energy-intensive process, which combines nitrogen from the air with hydrogen under high pressure (150 to 250 bar) and moderately high temperatures (400 to 650°C). An iron-based catalyst is used.

Around 90% of the energy requirements and GHG emissions from the Haber-Bosch process are from the production of hydrogen from gas feedstock. New pathways to lower-emission Ammonia include the use of electrolysis to produce hydrogen (water and electricity feedstocks), but these are not currently deployed at industrial scale.

Most of the Ammonia produced worldwide is immediately consumed to manufacture fertilizers. In the cases where Ammonia is transported offsite, production plants are usually adjacent to the coast and terminal facilities, allowing for straightforward loading onto a ship. Pipeline, truck, and rail transport are all alternative options for transporting Ammonia and are all well-established practices.

Ammonia can be stored in large tanks (typically 40,000 m^3, world's largest operational tank is 60,000 m^3). Most existing large-scale Ammonia tanks are also port-adjacent and involved in Ammonia imports/exports, so a significant amount of global storage infrastructure already exists that can be leveraged for future bunkering.

02. What is the bunkering process for Ammonia in the shipping sector?

Currently, a variety of bunker options are being explored. These include:

- Ship-to-ship (STS) breakbulk at an anchorage or a jetty-based location
- Shore-to-ship (SHTS) breakbulk at a jetty-based location
- STS bunkering at an anchorage or a jetty-based location
- SHTS bunkering at a jetty-based location
- Truck-to-ship bunkering at a jetty-based location

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03. What are the key considerations for establishing Ammonia bunkering infrastructure?

The establishment of Ammonia bunkering infrastructure for the maritime industry is subject to several key considerations:

Safety (human and environmental) – Due to the toxic and corrosive nature of Ammonia, specific equipment and protocols will be required to ensure safe design and enable safe handling, especially at large volumes. There is a range of existing safety systems & technologies that can be deployed.

Handling – Ammonia in its liquid form should be stored at low temperatures (-33°C) and atmospheric pressure. Storage tanks and handling systems must be designed according to specific requirements to prevent leakages and prevent the risk of serious injuries.

Stakeholder engagement – Specialised training on safe handling and the operational aspects is needed for all frontline workers to minimise risks. Transparent, well-communicated, and globally recognised safety protocols are required to gain the trust and acceptance of nearby communities.

Risk management – Strict risk management strategies that include emergency response protocols, coordination with local emergency responders, and adequate training for managing Ammonia-related incidents, including spills and leaks.

Insurance – Due to the risks associated with Ammonia, port storage, bunkering facilities, and shipping companies will need to collaborate with insurers to share the safeguards and risk assessment put into place.

04. Are there any challenges or limitations in the supply chain logistics of Ammonia for shipping?

Competition for decarbonised Ammonia from other industries, including fertilizers and power generation, will be a significant future challenge.

Current Ammonia transport infrastructure is focused on very specific supply chains, including fertilizers and chemicals manufacturing. There is no large-scale Ammonia bunkering infrastructure currently deployed anywhere in the world, and there is limited juxtaposition between key Ammonia production locations and key global bunker hubs. There have been several projects announced to retrofit & expand existing Ammonia storage facilities in key locations.

As for fuel costs and market development, the current cost of lower-emission Ammonia is much higher than conventional Ammonia. As more low-emission production projects reach FID and production scales-up these costs will come down, but the inherent uncertainty in the developing market is a challenge to building the first supply chains. Similar challenges were present during the development of LNG fuel, which began about four decades ago. LNG fuel is now considered a mature, fluid market.

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B. Regulations and Regulatory Environment

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01.
What regulations govern the use of Ammonia as a marine fuel?
What is the status of regulatory development at the IMO, and what are future timelines?

The "International Code of Safety for Ships Using Gases or Other Low-flashpoint Fuels" (IGF Code) provides an international standard for ships operating with gas and other low flashpoint fuels. But the IGF code does not presently have prescriptive requirements for a range of alternative fuels, including Ammonia. In December 2024, the IMO's Maritime Safety Committee approved interim guidelines for the safe use of Ammonia as a marine fuel. The guidelines are part of an ongoing process to address this regulatory gap, and to make amendments to the IGF Code where necessary. Revisions and additions are already anticipated as the first vessels gain sailing experience, and a formal revisit of the guidelines is scheduled for 2027 (possibly late 2026).

Under the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code), the use of toxic gas cargo for fuel (such as Ammonia) is prohibited. Draft interim guidelines for using Ammonia cargo as a fuel under the IGC Code are expected to be finalised at the IMO in September 2025, removing this prohibition. These changes are expected to enter into force in July 2026, but IMO member states have proposed that shipowners should be able to voluntarily adopt the anticipated changes, allowing Ammonia-fuelled, Ammonia carrying vessels to hit the water before then.

And all this progress occurs as the IMO considers other critical decarbonisation measures. At the MEPC83 meeting in April 2025, further progressing of a series of "mid-term" decarbonisation measures will be considered for entry into force. These measures include a goal-based standard for the phased reduction of shipping GHG emissions, and an emissions pricing mechanism.

02.
Certification

Numerous initiatives are ongoing to develop certification standards for Ammonia, including lifecycle guidelines for Ammonia as a maritime fuel. Maritime Book and Claim will be an important certification tool to enable the scaling of maritime Ammonia fuel.

03.
Are there any specific incentives or subsidies provided to encourage the adoption of Ammonia in shipping?

On a national level, there are various government initiatives for Ammonia shipping. In Norway, the funding body Enova frequently grants funds for Ammonia shipping and bunkering projects. In Japan, a recent round of government subsidies was granted to a series of projects involving the domestic manufacture of Ammonia engines, fuel tanks and other components. The Korea Export-Import Bank continues to financially assist the domestic construction of new-build vessels, particularly Ammonia-fuelled ones.

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C. Progress of Green Maritime Corridors

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01.
What are green maritime corridors, and how do they promote the use of alternative fuels like Ammonia?

Green maritime corridors are designated trade routes where efforts are focused on implementing zero-emission shipping practices, guaranteeing vessels a supply of alternative bunker fuel at either end of the route.

02.
What progress has been made in establishing green maritime corridors for the transportation of goods using Ammonia?

Several promising candidates have been identified. For instance, the Australia-east Asia green corridor aims to deploy Ammonia-fuelled ships by 2028 for the transport of iron ore from Australia, with plans to scale up significantly by 2050. Bunkering infrastructure is being developed in Singapore and the Pilbara region of Australia to support this. Currently, over 44 green maritime corridor initiatives are underway globally, with most prioritising Ammonia as a key fuel.

03.
Which regions or countries are leading the development of green maritime corridors for Ammonia-powered vessels?

These corridor initiatives are based on key existing shipping lanes, and globally important bunker locations. Singapore, the Netherlands, northeast Europe, west coast USA, the USA Gulf Coast, and east Asia are all leaders in corridor development, ranging from short-range, port-to-port initiatives to trans-oceanic routes.

04.
How do green maritime corridors contribute to the overall decarbonisation of the shipping industry?

Green maritime corridors provide a focused environment for testing and scaling alternative fuels like Ammonia. By aligning governmental policies, industry commitments, and infrastructure development, these corridors serve as models for emissions that can be replicated elsewhere.

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D. Impact on the Sector at Large

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01.
What are the potential economic benefits of transitioning to Ammonia in the shipping sector?

Compared to synthetic hydrocarbon fuels, including methane (e-methane, bio-methane) and methanol (e-methanol, bio-methanol), Ammonia can be produced at large-scale at a much lower cost. The reason for this is that atmospheric nitrogen (N2) is abundantly available in the air and available at a significantly lower cost compared to carbon sources such as biomass and carbon dioxide (CO2). Competition for synthetic hydrocarbon fuels is also a challenge: for example, biofuel adoption in aviation is already affecting its availability for shipping.

02.
What are the costs of adoption of Ammonia in the first five years expected to be for shipping operators and owners?

There are several Ammonia adoption costs for shipping operators and owners, including: CAPEX requirements, increased fuel costs, crew training, and increased ship management costs.

03.
What are the switching costs of Ammonia and how does it affect the future fleets of maritime shipping?

As Ammonia-fuelled vessels are in the early stages of adoption, newbuild and retrofit costs are yet to be established. Estimates for Ammonia-fuelled vessels range from 16% above the cost of conventional newbuilds, to 19-40% for retrofits.

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04.
How does the adoption of Ammonia affect vessel performance and operations compared to traditional fuels?

Emissions and performance – Engines fed with Ammonia as a fuel have an energy efficiency similar to traditional fuels. As Ammonia does not contain sulphur, emissions of sulphur oxides are eliminated. Ammonia slip, N2O, and NOX emissions are an environmental and GHG risk and must be fully mitigated.

Bunkering frequency – A switch to Ammonia will require more frequent vessel refuelling, due to its lower energy content than traditional fuels.

Pilot fuel – The combustion reaction of Ammonia can require pilot fuel for ignition. Currently, the most widely used pilot fuel is a small percentage of diesel (5-10%). This can be replaced by alternatives such as biofuel, or even hydrogen-Ammonia fuel blends produced by onboard Ammonia cracking. Engine manufacturers should be consulted about the latest developments in this space.

Vessel design and impact – Similar to methanol, Ammonia has an energy density by volume (and mass) of roughly half that of heavy fuel oil, meaning more fuel storage is required, as are more frequent bunker stops. Ammonia fuel requires a tank-in-tank containment design, so there is also a reduced volumetric energy density in addition to the calorific factor. Other considerations include the need for more complex safety systems, location of crew quarters and mess areas, and containment of all fuel lines from storage tanks to the engine room.

05.
What are the environmental benefits of using Ammonia in maritime transportation?

Ammonia does not contain carbon, so there are no carbon dioxide (CO2) emissions tank-to-wake. Ammonia does not also result in methane slip (CH4).

Ammonia combustion can result in Ammonia slip, N2O, and NOX emissions, which are all potential GHG pollutants. NOX emissions are mitigated via a Selective Catalytic Reduction (SCR) system. Similarly, N2O and Ammonia slip can be removed by catalytic treatment. Engine makers report excellent emissions results during testing: in some cases, emissions of some species are lower than conventionally fuelled engines (and within regulatory limits) before any exhaust after-treatment is applied.

From a lifecycle perspective, there is a GHG footprint for Ammonia fuel. Current Ammonia production pathways mean that gas-based Ammonia would likely have a similar GHG footprint to conventional maritime fuels. But as lower-emission production pathways scale and the GHG footprint of Ammonia fuel reduces, the benefits of using it as a maritime fuel will increase. In nearly all forecast scenarios for the uptake of Ammonia maritime fuel, it is e-Ammonia (or Ammonia produced from electrolytic hydrogen) that dominates, and this product can be produced with low to near-zero GHG emissions.