GSBN | Insights

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FIRES AT SEA, A NEW LANDSCAPE

Risk Mitigation Strategies for Safe Transport

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01 Executive Summary

Unique challenges posed by lithium battery fires at sea

The safe transport of dangerous goods has long posed significant challenges for the shipping industry. Preventing accidents involving chemicals, flammable liquids, and other hazardous materials requires careful handling and adherence to special protocols. Failure to comply with these protocols can result in fires or explosions aboard ships or in storage facilities, leading to devastating consequences, including the loss of human lives.

With such fires increasing in frequency, existing risk management methods must be assessed to understand how and why these accidents keep happening. One reason could be the rising demand for components like lithium batteries which, when handled incorrectly, can lead to fires and the release of toxic gases. The March 2022 Felicity Ace[1] incident, in which a car carrier sank with 4,000 vehicles on board, underscored the severity of these risks. More recently, in June 2025, the Morning Midas[2], a vessel carrying electric vehicles, caught fire in the Pacific Ocean, forcing 22 crew members to abandon ship. The blaze overwhelmed conventional CO_2-based suppression systems, highlighting the unique challenges posed by lithium battery fires at sea.

Today, several carriers are exploring new mitigation techniques to address risks caused by high temperatures and misdeclaration. GSBN, for one, is collaborating with accredited testing laboratories, industry groups, and carriers to counter these risks. It is working to ensure that misdeclarations and attempts at fraud are minimised and that companies have the best available information at hand about how to safely transport hazardous cargo.

As part of this journey, GSBN presented at the Ship Message Design Group (SMDG) 79th plenary session this year, discussing current learnings about automated data sharing and verification for the risk management of new, used, and waste lithium battery shipments. This latest paper compiles some of those strategies for handling such cargo amidst rising demand and challenges, as well as the growing role of technology in addressing these issues.

02 Background and Challenges

Ocean carriers are the backbone of the modern shipping industry. Their primary responsibility being the safe and efficient transport of cargo across the oceans. Given their potential consequences, dangerous goods (DG) have received significant attention in conversations surrounding cargo handling. There are clear guidelines for cargo owners and freight forwarders on how to provide documents related to DG cargo to booking carriers, vessel operators, terminals and customs. However, for some special categories of hazardous non-dangerous goods, such as lithium batteries, existing guidelines cannot fully mitigate the risks associated with improper handling. On this subject, ocean carriers must solve two main challenges to enhance cargo transportation safety: preventing misdeclarations and managing temperature risks and thermal runway.

In the case of lithium batteries, mechanical damage, thermal stress, or overcharging can trigger the release of toxic, flammable, and explosive gases, among other issues. Fires caused by these batteries are uniquely dangerous due to their rapid and intense nature. Additionally, the toxic gases released pose serious health risks to the crew. Of particular concern to insurers and the shipping industry at large is the risk of thermal runaway—a rapid, self-sustaining fire that can lead to explosions.

Preventing Misdeclarations

When minimising risks, the first challenge carriers contend with is the current, largely paper-based declaration process that is prone to fraud, tampering, and misdeclarations about cargo. While containerisation has revolutionised global shipping, its sealed and secure nature limits transparency about contents, increasing the risks associated with handling batteries. This issue extends beyond batteries to the transport of other critical cargo and dangerous goods as well.

To avoid such risks, some carriers are unwilling to accept potentially dangerous cargo or will insist on a lengthy and complicated acceptance process. However, this adds longer wait times for customers and results in bad customer experiences as they cannot confirm a booking for up to a week. This approach is unsustainable in the long run.

Temperature Risks and Thermal Runway

Even non-DG cargo that is sensitive to fluctuations in temperature may present critical risks if not handled properly. For example, low risk cargo like cocoa butter can lead to fires if incorrectly stored in temperatures higher than 35°C.

In the case of lithium batteries, temperatures between 35°C and 60°C present risk for thermal runway and if temperatures exceed 60°C, there is a high chance of explosion. In the case of the Felicity Ace, not only was the lost cargo cost estimated at US$155 million[3] for car manufacturers, but it also resulted in total vessel loss.

According to reports by the World Economic Forum (WEF), nearly three-quarters of all lithium that is mined is now being used for batteries[4]. Rising demands for consumer electronics, electric vehicles (EVs) and renewable energy storage mean that the lithium battery market is estimated to grow by over 30 percent annually[5] until 2030, highlighting the urgent need to enact policies that can minimise temperature risk.

Despite industry-wide acknowledgement that temperature related protocols are necessary there is yet to be a universal protocol. While some organisations and companies have attempted to monitor or govern the handling of temperature-sensitive cargo, the difference in protocols can lead to significant hazards in fluctuating temperature environments.

New batteries must contain 6% recycled lithium (rising to 12% by 2036)

New battery regulations in Europe[6] impose strict recovery requirements on manufacturers, mandating minimum proportions of recycled metals including lithium, in new batteries by 2031. These proportions will increase further by 2036. The increased demand for used batteries transport presents unique challenges. Used or waste batteries have distinct risk factors and require specialised handling by carriers compared to new batteries, adding another layer of difficulty.

One area under study is optimising temperature control of containers with batteries. Depending on the nature of the cargo, carriers can strategically place empty containers or non-combustible cargo next to those carrying batteries to create insulating buffers when transiting through or storing cargo in hot climates. However, change in container placement is not enough by itself, accurate data sharing must be implemented at the same time to ensure safe and efficient cargo transport—an unavoidable reality that will be broken down in detail in the following section.

03 GSBN's Work on Safe Transport

With the aforementioned learnings in mind, it is not surprising that stringent certifications are required in certain regions like China to guarantee compliance with national safety standards. To streamline this process and ensure that applicants and carriers can access up-to-date, credible information about their lithium battery cargo, GSBN has taken significant steps since 2023 to streamline the certification sharing process by establishing direct connections between carriers and accredited laboratories in China.

GSBN's Product for Safety Certificates/Certification Pooling

For the export of lithium batteries and other critical or dangerous cargo from China, a Certification for Safety Transport of Chemical Goods and Safety Data Sheet/Material Safety Data Sheet (SDS/MDSD) is mandatory for carriers. The initiative of connecting carriers with the accredited laboratories via GSBN provides a unified, secure, and efficient system that allows carriers to retrieve certification information directly from laboratories, eliminating manual processes and reducing errors.

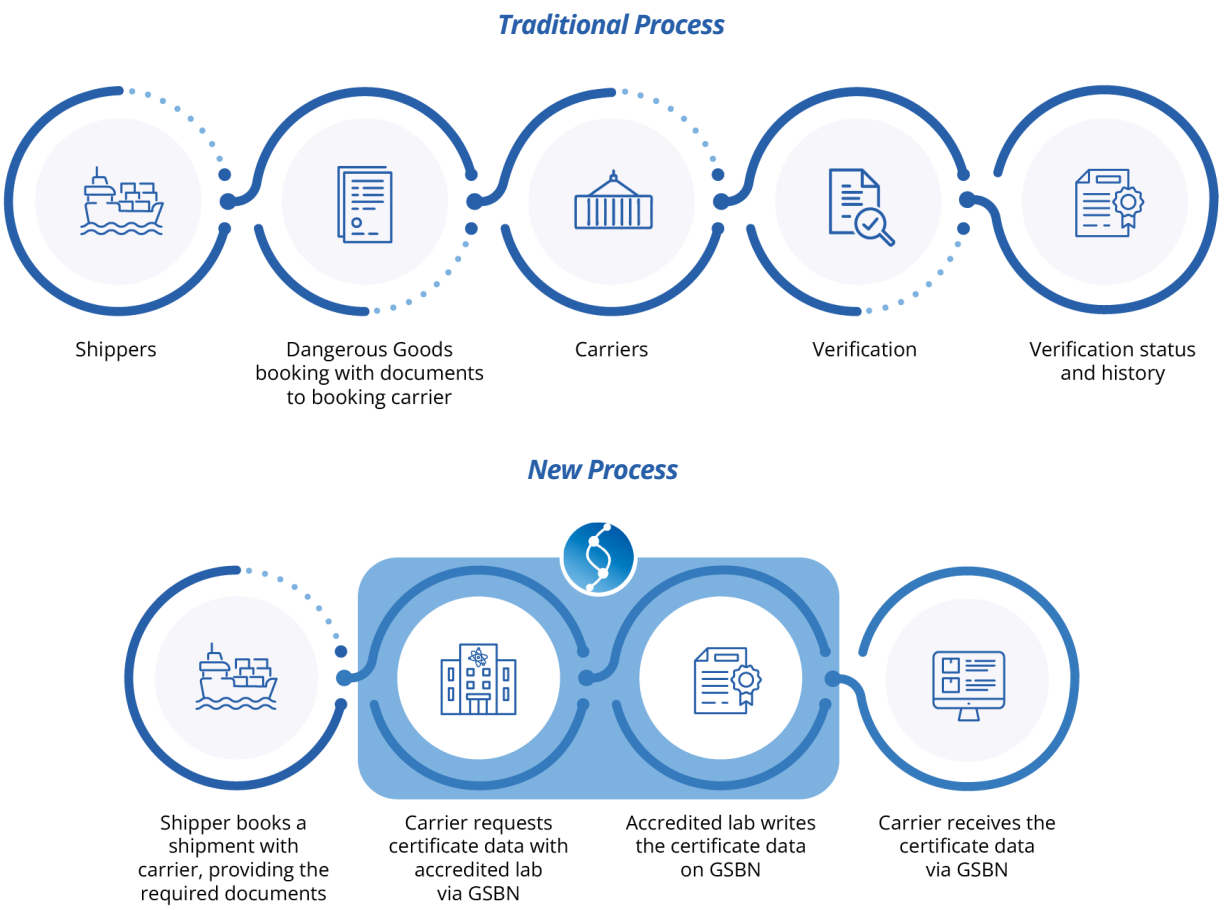
Currently, GSBN has partnerships with six major China National Accreditation Service for Conformity Assessment (CNAS) accredited laboratories spanning the northern to southern regions of China:

- CVC Testing Technology Co, Ltd
- Dangerous Goods Management (China) Ltd
- Guangzhou Customs District Technology Centre
- NRCC (Shenzhen) Safety Technology Co, Ltd
- Pony Testing Group Shenzhen Co, Ltd
- Shanghai Institute of Chemical Industry Testing Co, Ltd

Collectively these laboratories provide real-time, online responses to carrier inquiries during the booking process, playing a critical role in ensuring compliance with safety regulations. Leveraging GSBN's blockchain-powered platform, certificates can be securely shared between laboratories and carriers, ensuring data integrity, tamper-proof records, and enabling automated processing of structured data.

All six laboratories are accredited by the CNAS, demonstrating their technical competence and compliance with international standards such as ISO/IEC 17025, ensuring the reliability of testing reports. Different laboratories may specialise in specific fields and be recognised by customers/factories and carriers for their expertise and trusted services. By incorporating more laboratories into the network, GSBN aims to add value to a broader range of customers and carriers.

Streamlined Safe Transport Certification Data Exchange and Verification



Leveraging GSBN's blockchain-powered platform, certificates can be shared securely between laboratories and carriers, ensuring data integrity, tamper-proof records, and enabling automated processing of structured data.

Several industry leaders are already benefiting from this initiative. COSCO and OOCL are actively using the platform to streamline their certification verification processes, while MSC has completed several trial runs and is currently evaluating its product with one of its customers.

While the current focus is on certifications for lithium batteries, GSBN is exploring ways to expand support for other critical cargo types. For instance, some laboratories can issue certifications for charcoal or provide more detailed, structured data about the UN38.8 test report[7] for lithium batteries. Such enhancements would enable carriers to perform more accurate and efficient risk assessments, further improving safety and compliance for a wider array of critical and dangerous cargoes.

GSBN's Growing Ecosystem of Connected Certification Labs

CVC Testing Technology Co, Ltd

China National Electric Apparatus Research Institute Co., Ltd. (CEI, stock code: 688128) is affiliated to SINOMACH which is a Fortune Global 500 enterprise. It was established in 1958. CVC is the authoritative third-party quality and technical service brand of CEI, CVC is Chinese mirror committees/subcommittees of 16 IEC TCs/SCs, China national centre for quality inspection and test of electrical appliances, China national centre for quality inspection and test of intelligent vehicle components. The battery testing and appraisal institutions was designated and authorised by the civil aviation administration of China in the first round. The leading organisation for battery work group of national technical committee 374 on products test methods of standardisation administration of China.

Dangerous Goods Management (China) Ltd

Established in 2005 and headquartered in Beijing, Dangerous Goods Management (China) Ltd specialises in hazard identification, testing, and training for dangerous goods transport. Operating under IATA Dangerous Goods Regulations, the company conducts safety testing for chemicals, lithium batteries, and other items, issuing professional reports. As the Chinese member of the Netherlands-based DGM Company's global network, it provides aviation transport safety assurance with 72 employees and eight branch offices nationwide as of 2024.

Guangzhou Customs District Technology Centre

Established in 2005, it is a directly affiliated institution of Guangzhou Customs. As China's premier customs technical body, IQTC holds the broadest scope, most recognised accreditations, strongest capabilities, and largest volume of tasks. It performs statutory inspection, quarantine, testing, identification, and monitoring of import-export products. The centre provides technical services including risk assessment, consultation, R&D application, and TBT research/response. Key facilities include: 24 State Key Testing Laboratories; a MOHRSS-approved Postdoctoral Station; the customs system's first imported new energy vehicle testing facility; and the National TBT Research Base for New Energy Vehicles.

NRCC (Shenzhen) Safety Technology Co, Ltd

NRCC (Shenzhen) Safety Technology Co, Ltd

NRCC Safety Technology provides certificate verification services while advancing digital innovation in dangerous goods management. The company developed an intelligent risk assessment system via WeChat, allowing cargo owners to input information and automatically generate risk reports with matching certification and packaging requirements. This solution enables rapid dangerous goods identification, provides UN packaging recommendations, and assists with transport certificates. The early intervention approach helps minimise misdeclarations, reduces approval times, and enhances supply chain safety.

Pony Testing Group Shenzhen Co, Ltd

Established in 2002 and publicly listed in 2020 (stock code: 300887), Pony Testing operates over 30 laboratory bases with 6,000+ employees and was among China's first to obtain CNAS 17020 inspection qualifications. Recognised by major carriers including Air China, COSCO SHIPPING, China Southern Airlines, and UPS, the company provides cargo transport condition identification, hazard assessment, and UN38.8 testing report[7] for batteries and chemicals. Pony Testing has integrated with critical projects like Shenzhen Airport's lithium battery management system and achieved data connectivity with COSCO SHIPPING and OOCL through the GSBN platform.

Shanghai Institute of Chemical Industry Testing Co, Ltd (SICIT)

SICIT (originally established in 1958 as the Physical and Chemical Laboratory of the Shanghai Chemical Industry Research Institute under the Ministry of Chemical Industry) began conducting dangerous goods identification services in 1994, making it a pioneer in China's dangerous goods transport identification sector, covering all four transport modes—maritime, air, rail, and road—and all nine classes of dangerous goods. Authorised by 11 government agencies and recognised by over 100 shipping companies and 160 airlines, SICIT operates 20+ branches nationwide. Over three decades, it has developed a database of 300,000 goods, intelligent algorithms, and a rapid identification system. SICIT has also expanded into urban safety, offering services in urban operations, new energy, industrial production, and ecosystem safety across 22 professional domains.

Creating a Certification Pool for the Industry

Certification Pool can act as a **single source of truth** for stakeholders to record and share information about the certificates.

Visual representation of certification pooling and involved parties.

Looking ahead, GSBN envisions the creation of a Certification Pool—an innovative approach to revolutionising the management and sharing of safe transport certificates. This approach would bring together all key stakeholders, including beneficial cargo owners (BCOs), laboratories, carriers, and could potentially expand to insurers, in a collaborative ecosystem.

The Certification Pool would serve as a centralised repository where certificates could be securely stored, accessed, and validated by authorised parties. For BCOs, this means easier management and tracking of certificates, eliminating the need to deal with fragmented records or disparate systems. All certificates would be consolidated in one place, ensuring quick retrieval and seamless compliance with carrier requirements.

Laboratories, as the primary issuers of these certificates, would also benefit from streamlined operations. They could upload certificates directly to the pool, attest the authenticity of certificates issued by them, and ensure that no unauthorised alterations occur. The pool would foster greater trust and transparency, allowing the laboratories to track the usage of their issued certificates.

For carriers and other certificate consumers, the Certification Pool would act as a single, reliable source of validated certificates. In harnessing GSBN's blockchain-enabled infrastructure, it would eliminate manual verification processes and reduce the risk of fraud through direct authentication as well as the principle of immutability. Furthermore, the pool could store valuable metadata, such as a certificate's usage history, any remarks, or flags indicating potential risks. This shared intelligence could enable carriers to conduct more comprehensive risk assessments and make better-informed decisions, ultimately enhancing safety and compliance across the supply chain. By connecting all participants in a shared ecosystem, the Certification Pool has the potential to streamline certification verification and sharing processes for critical and dangerous cargo.

04 Certificates for Used, DDR (damaged/defective/recalled), and Waste Batteries

GSBN has also started to explore how its Safe Transport Product Suite can be extended, and deployed for used, DDR, and waste batteries. Feedback gathered from stakeholders, including representatives from lithium battery and EV manufacturers, at the latest SMDG industry plenary suggests that existing guidelines for used, DDR, and waste batteries often lack explicit or realistic parameters, while different chemistries further complicate risk and compliancy management, as there's currently no "blanket solution" available—for example, NCM (Nickel Cobalt Manganese) versus LFP (Lithium Iron Phosphate).

In this setting, safe transport certificates can serve as crucial, certified and verifiable (digital) documentation ensuring the safe handling and transport of, in particular, lithium-ion and lithium-metal batteries, which are considered a special category of dangerous goods that are subject to specific packaging, labelling, and transport regulations to prevent risks like fire, heat generation, or release of toxic substances.

In this use case, GSBN will aim to extend its current Safe Transport Product scope to additionally cover used, DDR, and waste batteries focussing on the following key aspects: monitoring and confirming compliance with regulations, providing input or instructions for emergency response, and establishing accountability.

Addressing Compliance and Legal Requirements

The certificate enables digital exchange and verification of safe transport certificates to demonstrate that batteries and their packaging meet the specific requirements of international and regional regulations, such as the IMDG Code (International Maritime Dangerous Goods Code)[8] for the transport of dangerous goods. Failure to comply with these regulations can result in fines and legal action for both the shipper and carrier.

Ensuring Safety

Enriching data capture in safe transport certificates can be used as an additional or enhanced tool for risk assessment by both shippers and carriers. This helps to minimise incidents and risk of fire, explosions, and other hazards associated with lithium-ion and lithium-metal batteries. For example, based on the State of Health (SOH) and State of Charge (SOC) analyses of the batteries (currently not mandatory in IMDG Code[8]), especially in cases of damage or leakage. Furthermore, certificates can be enhanced for certain special categories, including specific instructions on how to handle a battery fire or leak, guiding emergency responders with the appropriate safety response in case of emergencies.

Establishing Accountability, Traceability and (Compliance/Evidence) Documentation

Enriched certificates can provide additional specifications, such as lithium quantity, complementing other records detailing the battery's journey, including its origin, destination, handling procedures, and mode of transport. These specifications can be considered and managed holistically as, for instance, the quantity being transported will affect the documentation requirements, and whether the batteries are being transported by air, sea, or road will affect the specific regulations that apply.

In the event of an incident or loss during transit, the certificate can be used as a clear reference document to establish liability and provide evidence for insurance claims. Manufacturers and suppliers must ensure that their batteries are certified for transport and provide the necessary documentation to their customers.

Furthermore, addressing specific requirements for:

- **Different types of batteries:** Different types of batteries (lithium-ion, lithium-metal, etc.) have different transport requirements, which are to be reflected in the certificate; and

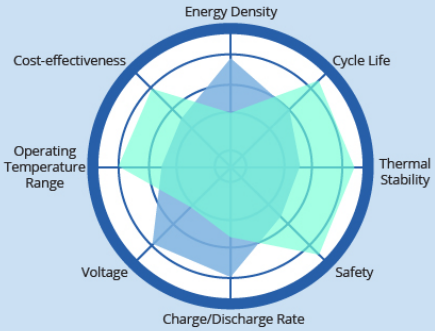
- **Special categories like used, DDR, and waste batteries:** Shipping used, DDR, and waste batteries requires strict adherence to packaging, labelling, and adherence to documentation regulations to ensure safety and compliance. Used batteries are generally shipped for recycling or disposal, requiring specific packaging instructions. DDR batteries are batteries that usually have sustained physical damage, exhibit signs of malfunction, or have been recalled due to safety concerns and require special handling due to the potential for fire, leaks, or other hazards. Waste batteries, also known as spent or end-of-life batteries, are used batteries that have reached the end of their useful life and are no longer able to hold a charge or power a device as intended, and classified as hazardous waste. They are subject to specific regulations for hazardous waste disposal often involving collection under "universal waste" standards requiring additional precautions including specific packing instructions, such as ADR P908[9], which are typically reflected in the safe transport certificate. For DDR batteries, such certificates may also specify the type of special packaging required such as fire-resistant cases or overpacking. In practice, shipping used and DDR batteries often requires more documentation than waste batteries due to the need to demonstrate that they are not hazardous waste and comply with specific regulations for transporting them. This can involve detailed declarations, such as per UN 38.3[10] and IMDG regulations[8], certifications, and potentially special testing procedures, which can be more comprehensive than those required for waste batteries.

In essence, the safe transport certificate is more than just a compliance document. It's a crucial tool for ensuring the safe and legal transport of batteries, protecting people, property, and the environment.

Safe Transport Certificates Tailored to Used, DDR, and Waste Batteries

Used, DDR (Defective, Damaged, or Recalled) and Waste batteries present unique challenges for safe transport due to their potential hazards and regulatory complexities

Require special packaging and handling due to the higher potential for fire, leaks, or other hazards



Different chemistries involved further complicate risk and compliancy management

Guidelines often lack explicit or realistic parameters, and there's no "blanket solution" available (eg: for NCM vs LFP)

GSBN has started to explore how its Safe Transport Product Suite can be extended, and deployed for Used, DDR and Waste batteries to

Enable digital exchange and verification of Safe Transport Certificates to demonstrate that the batteries and their packaging meet the specific requirements

- Provide additional specifications, such as lithium quantity to complement other records regarding the battery's journey, including its origin, destination, handling procedures and mode of transport
- Enrich data capture associated with lithium-ion and lithium-metal batteries, eg: SOH and SOC analyses can be used as an additional or enhanced tool for risk assessment by both shippers and carriers and help minimize incidents and risk of fire, explosions, and other hazards
- For certain special categories, specify the type of special packaging required and specific instructions on how to handle a battery fire or leak

How Safe Transport Certificates can be enhanced for Used, DDR, and Waste batteries.

05 Mitigating Container Fire Risks: The Critical Role of Temperature Monitoring

With the shipping industry facing increasing challenges in ensuring the safe transport of temperature-sensitive cargo, an internationally recognised set of standards is crucial for ensuring that all shipments are handled properly, with safe temperatures maintained throughout every journey. The guidelines set by the International Maritime Organisation (IMO) on the safe transport of dangerous goods by sea—also known as the IMDG Code[8]—are an important starting point.

According to the IMDG Code[8], packages and cargo must be stowed at least 2.4m away from heated ship structures, such as steam pipes, heating coils, top or side walls of heated fuel and cargo tanks, bulkheads of machinery spaces, or other hot surfaces where the surface temperature can exceed 55°C. Certain cargo types may require "under deck" stowage to avoid direct sunlight or high temperatures. For those stowed on deck, depending on the nature of the goods and the planned voyage, precautions should be taken to ensure that exposure to direct sunlight is reduced or avoided altogether, with the assumption that 35°C is a key threshold for critical cargo.

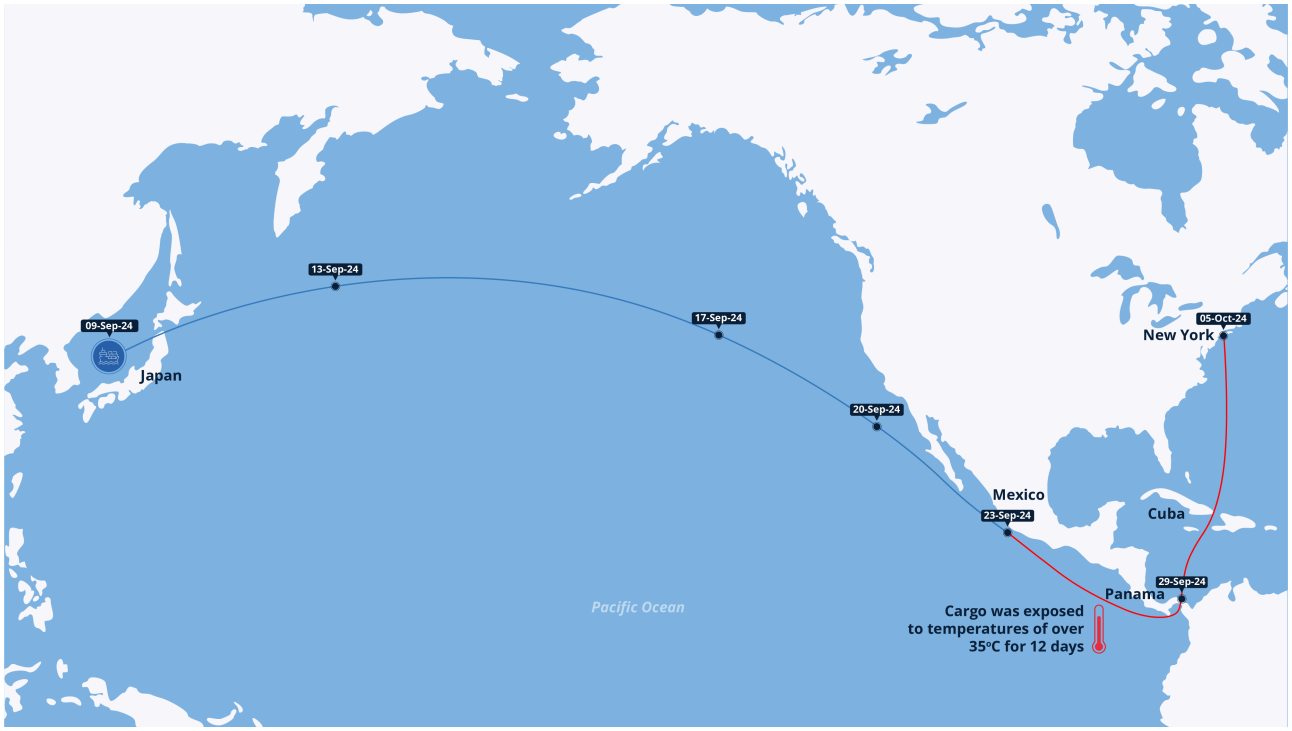
We also observe that individual groups and organisations are implementing their own strategies, operational protocols and technologies to regulate and control temperature, mitigate these risks and prevent potential damage. For instance, in response to China's Ministry of Transport requiring Mainland ports to conduct spray cooling operations on hazardous materials on-site during the high-temperature summer season (mid-Jun – mid-Oct) to ensure the safe storage of potentially hazardous cargo containers in the port area, Shanghai Container Terminal has deployed a water sprinkler system which automatically activates when ambient temperature rises above a threshold of 35°C to cool down containers with critical cargo.

Monitoring the temperature of containers before overheating and the impact of sunlight on temperature change are also paramount precautions. More advanced devices, like Thermal Imaging Cameras (TIC), Temperature Data Loggers, and Portable Weather Stations, are now available for vessel operators and terminals operators to monitor temperature changes in real time, keep track of the container temperatures and collect weather data. Some ports have been upgrading their equipment with infrared temperature-scanning systems to exercise proactive temperature monitoring of hazardous containers. If a container's temperature exceeds 35°C, the system automatically initiates spray cooling until the temperature drops.

Equipped with more advanced technology and monitoring tools, the maritime industry is also able to do more and more in-depth studies on temperature control. Below are some of the key findings from a study by one of the world's top ocean carriers based on 38 surveys conducted in the past 2 years, analysing the factors and conditions that impact containers' temperatures:

- **The colour coating and material of a container** has a significant impact on the inside temperature of containers while exposed to direct sunlight. At noon under direct sunlight, unplugged reefer containers with white coating enjoy an internal temperature 20°C lower than general containers with maroon coating under similar conditions
- **Where a container is stowed is another important factor.** A general container placed below other containers—compared to a general container directly exposed to sunlight—experiences a 14°C lower temperature after 9 hours of exposure.
- One **September voyage** from China to the US East Coast via the Panama Canal had ambient temperatures above 35°C in the cargo hold for over 12 days (between Mexico and New York). Hence, location and seasonality are also important parameters for risk assessment.

Illustrative Impact of High Temperature Exposure



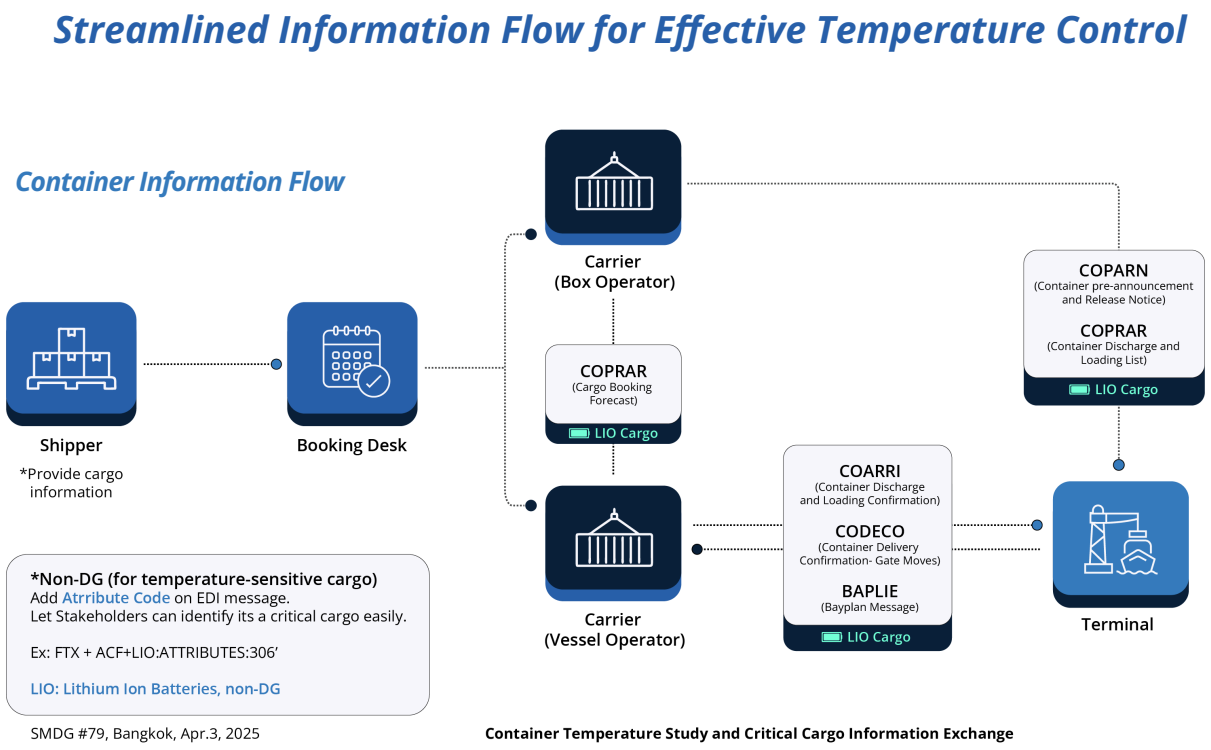
Data from a vessel travelling from China to the US in September shows the cargo was exposed to temperatures of over 35°C for 12 days.

A better understanding of these factors can help vessel operators, terminals, and depot operators to consider these impacts and take more effective precautions when they are planning for stowage of containers, both on the yard and the vessel.

However, these steps alone are not sufficient. It is also essential that accurate and streamlined information be exchanged between carriers that accept the booking from cargo owners—collecting the relevant information from the shipping instruction phase—and vessel operators who plan and execute the cargo stowage. This information should also be shared with terminals and depot operators as critical input for cargo storage before load on vessel and post discharge. In a typical shipment, at least five or six parties are involved in the communication chain. Over the years, the industry has developed a comprehensive handling procedure for Dangerous Goods which are regulated by the International Maritime Organisation (IMO). However, accurate and streamlined exchange of data among all stakeholders to identify temperature-sensitive and critical cargo before a stowage plan is developed still presents a significant challenge.

To ensure effective communication between all parties in the shipping process, it is crucial to standardise the protocol for data exchange. This should be built upon a standardised framework to ensure vital information about temperature-sensitive cargo is captured.

For example, the SMDG standard offers a valuable framework for carriers, vessel operators, depot operators, and terminals to exchange essential cargo data. This includes defined attribute codes for non-dangerous, temperature-sensitive cargo (for instance, LIO for Lithium-Ion Batteries). This information should be included in EDI messages, such as the Container Announcement (COPARN), Container Gate-in/Gate-out Report (CODECO), Container Discharge/Loading Report (COARRI), and the stowage plan of a container vessel (BAPLIE) to ensure consistent data exchange among all stakeholders.



Proposed container information flow for temperature-sensitive cargo leveraging SMDG code.

> ***Today, carriers face growing challenges in safely transporting dangerous goods, driven by rising shipments of batteries for electric vehicles, new energy solutions, and consumer electronics, as well as increased demand for used and damaged battery shipments. This calls for new methods in safer handling and smarter stowage planning. Strategies like temperature optimisation that incorporate elements, such as predictive weather data and thermal profiling, can improve fire risk mitigation. At SMDG, we're collaborating with partners like GSBN to standardise data exchange protocols around these approaches, supporting a safer, more resilient global supply chain.***
>
> — Ann-Christin, Chair of SMDG

By leveraging SMDG codes, the industry can minimise miscommunication and enhance operational efficiency by paying special attention to critical cargo. Adopting a standard data exchange pattern can ensure all parties receive consistent and accurate data about the nature of the cargo. Given that information exchange predominantly occurs through digital channels like Electronic Data Interchanges (EDI) and Application Programming Interfaces (API), adopting an industry-wide standard would significantly decrease integration complexities.

Enabling all parties involved to exchange data using the SMDG format also reduces delays associated with data verification and clarification. These industry standards will accelerate the digital transformation of operations while decreasing the likelihood of human errors and offline communications.

By leveraging critical data such as attribute codes and converting findings from studies on factors affecting cargo hold temperatures into actionable insights, companies can update their Standard Operating Procedures (SOPs). This will allow them to identify and label critical or temperature-sensitive cargo within their systems and to take appropriate precautionary measures. Operators will be alerted about which proactive measures to enable during the stowage planning phase to avoid incidents.

With advancements in technology enabling cost-effective, real-time temperature monitoring during transportation—coupled with innovations and research conducted by leading terminals and shipping lines—new knowledge and best practices on temperature-sensitive cargoes is continuously emerging.

Information exchange is crucial to ensure that all parties handling the cargo during transportation have a shared understanding of the risks associated with it. This is especially important for temperature-sensitive cargoes. In this context, industry standardisation bodies like SMDG can play an important role by standardising data exchange protocols and elements, ensuring that everyone involved is aware of the potential risks and can act according to the SOPs.

Furthermore, industry organisations like the Cargo Incident Notification System (CINS), which focus on improving cargo transportation safety, can play a vital role in supporting industry collaborations in developing and sharing guidelines on container temperature management, monitoring and best practices. This helps industry players ensure their standard operating procedures (SOPs) remain up to date.

By aligning efforts across knowledge sharing, information exchange, and standard-setting, the industry can create a safer and more efficient transportation ecosystem that protects cargo, mitigates risks, and, most importantly, safeguards human lives.

06 Conclusion

While the safe transport of dangerous goods has always been a critical concern for the shipping industry, the nature of the challenge has changed. Rising demand for shipping lithium batteries that are prone to uncontrollable fires when mishandled, coupled with new challenges arising from the circular economy and the need to recycle those batteries, has added a new layer of complexity to the issue. These fires not only endanger crews and vessels but also threaten other cargo and the environment, making the management of such shipments riskier than ever before.

Promising mitigation techniques, such as enhanced temperature control measures, represent a step in the right direction to address these challenges. However, their successful implementation hinges on accurate and trustworthy data. The present reliance on paper-based declarations and certificates leaves carriers vulnerable to misdeclarations and fraud, whilst their verification is time consuming and still leaves a lot of room for risk. For the customer, this also becomes a cumbersome process as requirements and processes vary between carriers and are very complex to comply with. In short, the paper-based approach for the declaration and certification of lithium batteries is no longer fit for purpose in today's environment.

For this reason, trusted end-to-end data sharing and automated verification is crucial to enhancing safe handling and transport of lithium batteries. In this regard, the shipping industry requires a collaborative, technology-driven infrastructure to enhance transparency and accountability, as well the participation of accredited testing laboratories.

Addressing this, GSBN has significantly grown its ecosystem of accredited testing laboratories in China with two aims. First, is to create a "chain of trust" across the process from laboratory to customers, providing immutable information via the blockchain. Second, is to actively collaborate with these different parties to create a new protocol of trusted data sharing and verifiable certification. This enables carriers to verify information, streamlining the entire process and enabling them to handle lithium batteries properly.

These advances in safe transport techniques, together with a trusted digital protocol, benefits all stakeholders. Shipping companies gain improved safety and operational efficiency through trusted data and streamlined approval processes with clear audit trails for investigation if required. Customers gain confidence with a simplified and more streamlined DG and critical cargo booking approval process.

Accredited testing laboratories enhance the value of their certificates and ensure that paper certificates are not misused. Insurers benefit from fully auditable datasets for both the booking approval and any actions taken by carriers that may influence premium readjustment.

Yet this is just the beginning. For enhancements in the safe transport of lithium batteries, critical cargo, and dangerous goods to become systematic and for further innovation to flourish, collaboration across the industry is key. Carriers, customers, insurers, and laboratories must work together—developing new techniques, adopting new solutions, and sharing learnings with each other.

GSBN is ready to facilitate this collaboration and provide its platform to enable data sharing. GSBN invites industry stakeholders to participate in this vital effort, enabling not only safer logistics, but also a foundation for long-term resilience.

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08 About GSBN

Enabling paperless, accessible, and sustainable global trade.

The Global Shipping Business Network (GSBN) is a neutral, not-for-profit consortium whose mission is to enable paperless, accessible and sustainable growth in global trade with its data infrastructure and ecosystem of partners. GSBN facilitates trusted collaboration between participants across the shipping industry to enable greater efficiencies, and paperless trade as well as supporting the shipping industry's decarbonisation transition.

GSBN's ecosystem includes shipping lines, terminals, banks, application developers and other consortia. The entire network accounts for more than half of the containers handled in the world.

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