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CIP Inter-American Committee on Ports

INFORMATIVE BULLETIN

Sustainable Port Management and Environmental Protection

1ST EDITION

Suction dredging of docks during construction works in Capurro area

DISPOSAL OF DREDGED MATERIAL IN GEOTEXTILE TUBES FOR LAND RECLAMATION AT THE PORT OF MONTEVIDEO

Geotextile filling process

Aerial view of the area with geotextiles

As part of the port development works carried out by the National Port Administration (ANP) at the Port of Montevideo, specifically during the construction of new fishing docks in the Capurro area, dredging operations were carried out in 2021 down to a depth of -5 meters, including the disposal of dredged material into geotextile tubes used for land reclamation in the bay.

Initially, tests were conducted in collaboration with the University of the Republic of Uruguay (UDELAR), Faculty of Engineering (FING), on the use of geotextiles and the containment of contaminated dredged mud. This led to the implementation of a process that begins with the flocculation of the mud to promote dehydration through filtration, followed by the separation of water contained in the dredged sediments from Montevideo Bay, and finally, their disposal in geotextile tubes. This initiative served as the foundation for the project's execution.

The activity consisted of extracting sediments using a suction dredger, which were then transported through a system of flexible pipelines. These sediments passed through a physical filter to retain solid waste. Subsequently, they underwent a treatment with a flocculant at a chemical plant. The flocculant acts on the molecules of the contaminated mud, facilitating water filtration and encapsulation, which ultimately allows for their deposition in geotextile tubes.

This best practice allowed for the encapsulation of 65,000 m^3 of dredged sediments likely to contain environmental contaminants. Their use for land reclamation resulted in a reduction of both the costs associated with transporting the material to disposal areas and the potential environmental impacts that would have been generated in those areas.

National Port Administration, Uruguay

DOMINICAN REPUBLIC ON THE MOVE: THE NATIONAL LOGISTICS COUNCIL AND THE ARCHITECTURE OF A REGIONAL HUB

The modern history of international trade has been written by countries capable of mastering the art of connectivity. Today, in a world where logistics defines competitiveness, the Dominican Republic takes a firm step toward its strategic reconfiguration with the creation of the National Logistics Council (CNL): a multisectoral governance body aimed at transforming the country into the most efficient, integrated, and resilient logistics platform in the Caribbean and Central America.

This initiative did not emerge out of nowhere. It is an institutional response to an undeniable reality: the country possesses the most privileged geographical location in the Caribbean, world-class port infrastructure, consolidated free zones, and a network of trade agreements granting access to over one billion consumers. However, until now, these assets have operated in a fragmented manner. With the CNL, a new era begins: one of logistics orchestrated under a unified national vision.

The Council, created under Law No. 30-24 on Maritime Trade, has the mission of shaping public policies, coordinating institutions, and aligning private sector interests around a common goal: to provide the country with a world-class national logistics strategy. This is not just about facilitating trade. It is about redesigning how value is moved, stored, transformed, and exported to and from Dominican territory.

For the first time, logistics will not be seen as a purely technical-operational issue, but as a cross-cutting pillar of economic development. The CNL will promote the creation of intermodal logistics corridors, reduce times and costs in foreign trade, digitize critical processes such as customs clearance, and serve as a platform to attract investment in advanced manufacturing, regional distribution centers, last-mile technologies, and specialized logistics services.

The CNL's impact will extend beyond the commercial sphere. It will also serve as a tool for territorial development by integrating productive hubs from the north, south, and east into a smart infrastructure network, connecting ports, airports, free zones, and industrial parks. This decentralized approach will allow regions across the country to directly benefit from the logistics boost creating jobs, encouraging local entrepreneurship, and diversifying the national productive matrix.

Along the same lines, sustainability will be a guiding principle. The new national logistics strategy will incorporate green logistics practices, energy efficiency, electric mobility, responsible management of industrial waste, and climate change adaptation. In this way, the Dominican Republic will compete not only in efficiency, but also in environmental standards, an increasingly vital component of 21st-century global supply chains.

At the regional level, the impact will be equally powerful. With the establishment of the Council, the country sends a clear signal to international partners, multilateral organizations, and investors that we are ready to lead the logistics transformation of the Caribbean. We are ready to become a hemispheric redistribution hub serving nearshoring, triangular trade, regional customs integration, and the strategic production of high-value goods.

The creation of the CNL is not merely an institutional restructuring. It is an act of historical vision that positions logistics not as a task for technicians, but as a high-level State policy. Through this, the Dominican Republic is not only accelerating its trade, it is accelerating its development, its continental integration, and its presence in the global economic architecture.

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FISHING DOCKS: WHERE THE FUTURE OF THE SEA IS BORN IN THE DOMINICAN REPUBLIC

In the heart of the Dominican coasts, where the sea embraces the land with strength and the lives of thousands depend on the sway of tides, a quiet—yet powerful—transformation is taking place. Far from the hustle and bustle of major commercial ports, community fishing docks have become symbols of hope, sustainability, and progress.

Since 2022, the Dominican Port Authority (APORDOM) has led an ambitious program for the renovation and construction of fishing docks in historically neglected coastal communities, positively impacting the lives of more than 4,000 families in areas such as Barahona, Samaná, Montecristi, and Azua. These infrastructures are not merely landing piers: they are comprehensive platforms for human, economic, and environmental development. Each dock has been designed as a center for community advancement.

In addition to supporting the daily work of artisanal fishers, the fishing docks provide dignified spaces for the marketing, processing, and preservation of marine products, thus strengthening the fishing value chain. Undoubtedly, these projects have empowered entire communities, integrating women and youth, generating direct and indirect employment, and fostering a new culture of respect for the ocean.

Aware of the fragility of marine ecosystems, APORDOM has incorporated environmental sustainability criteria into every project: solid and oil waste collection systems, eco-friendly and salt-resistant materials, solar panels for efficient lighting, and training in responsible fishing and mangrove protection. The Palenque Fishing Dock, for example, reopened in 2023, is a flagship case: it combines modern infrastructure with environmental education and community management, becoming a replicable model for the region.

The indicators are clear: a 35% increase in fishing productivity, a significant reduction in environmentally harmful practices, and a renewed appreciation for fishing work as a driver of local development. The projection for 2025–2026 includes the establishment of at least six new fishing docks, thus consolidating a resilient, sustainable, and socially inclusive coastal network.

This experience, aligned with the goals of the Roatán Action Plan 2023–2026 of the Inter-American Committee on Ports (CIP/OAS), represents a good practice at the intersection of infrastructure, social equity, and environmental protection. From the Dominican Republic, fishing docks do more than catch fish, they capture dreams, opportunities, and the future. When the sea meets a worthy port, an entire nation is strengthened.

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SUCCESSFUL PRACTICE: VALORIZATION OF SLAG AS BACKFILL MATERIAL

During the construction of the new Raos 9 dock in 2023, 13.000 m^3 (30.000 tons) of slag material were used as fill. The material used is the result of the ferrous metal smelting process at the FerroAtlántica plant, located in Boo de Guarnizo, 7 km from the Port of Santander construction site.

This practice has avoided the need to use materials extracted from quarries and prevented the disposal of steel industry aggregates in landfills.

The benefits have been:

- Reuse of waste destined for disposal, ensuring the protection of the environment and human health.
- Saving of natural resources by avoiding the extraction and use of aggregates from quarries.
- Reduction of greenhouse gas emissions and atmospheric pollutants, by reducing the kilometers of transport of slag material from the FerroAtlántica plant to the landfill and all associated operations.

The slag used is composed of green vitreous particles with a smooth texture and sharp edges. It comes from ferroalloy slag subjected to a cooling, screening and grinding process to convert it into aggregates for use in construction and public works.

It is regulated in Decree 100/2018, of December 20, on Slag Valorization in the Autonomous Community of Cantabria, which establishes the legal regime applicable to the management of slag in order to promote its valorization.

Port Authority of Santander, Kingdom of Spain

SUCCESSFUL PRACTICE:
NEW SERVICE VESSEL WITH HYBRID TECHNOLOGY

In 2025, the Port Authority of Santander commissioned a new service vessel with hybrid propulsion technology, featuring two diesel engines and two electric engines of 45 kW each, connected to the transmission system.

This new vessel replaces two previous vessels that operated using type B diesel fuel. It will consolidate all the tasks previously carried out by those two vessels within the public port domain, including: bathymetric surveys, control and maintenance of maritime signals, fender repairs and maintenance of quay equipment, technical visits and inspections of port facilities from the water.

The vessel, named SOLIA DOS, was built by Metaltec Naval S.L. and is the only hybrid technology vessel in Cantabria and in the Spanish Port System.

The vessel has a length of 11 meters, a beam of 4 meters and a draft of 1 meter. It has a total capacity of 12 people and a maximum speed of 10 knots. It is built with naval steel and stainless steel.

The benefits are:

- Reduction in diesel consumption thanks to electric engines.
- Lower greenhouse gas emissions.
- Reduction of pollutant gas emissions.
- Reduction of hazardous waste in maintenance and repair operations.

The vessel has been built according to sustainable and low maintenance criteria.

Port Authority of Santander, Kingdom of Spain

Sustainable Port Management and Environmental Protection at COMPAS: A Commitment to the Circular Economy and Sustainable Development

At COMPAS, the only multipurpose port network in Colombia, we are committed to carrying out clean and sustainable port operations aligned with the United Nations Sustainable Development Goals (SDGs). This commitment is implemented through an environmental strategy built around four core pillars: circular economy, climate change, sustainable cities, and the conservation of natural capital.

Zero Waste Certification: A Milestone in Circular Economy

One of our most outstanding achievements in 2025 was obtaining the Icontec "Zero Waste" Certification Version 5, Gold Category—recognition of COMPAS's high level of efficiency in waste management. This certification validates the implementation of a system that significantly reduces the volume of waste sent to landfills and promotes a culture of reduction, reuse, and recycling.

Key figures from our 2024 waste management efforts include:

- Over COP $435 million saved through the final disposal of reused waste
- More than COP $130 million earned from the sale of recyclable materials
- Donation of 1,788 tons of organic waste for composting and animal feed
- Proper management of 745,230 kg of recycled waste

This circular economy approach has been internationally recognized. In 2024, COMPAS was awarded the Maritime Award of the Americas for Green Port Management and Sustainability by the Secretariat of the Inter-American Committee on Ports (CIP) of the OAS, for projects related to the collection, use, and efficient consumption of rainwater and recirculated water in three of our five terminals.

Climate Change Adaptation

Our second strategic pillar is climate change. We have implemented mitigation and adaptation actions that include:

- Annual measurement and offset of our carbon footprint
- Optimization of energy consumption
- Climate risk assessments by port facility

As a result, we have received the True Green Seal – Tree Category from the CO2Cero Foundation for three consecutive years (2022, 2023, and 2024), in recognition of our voluntary actions to reduce climate change impacts.

Building Sustainable Cities

En el ámbito social y urbano, promovemos la integración puerto–ciudad para fortalecer la resiliencia y sostenibilidad en las áreas de influencia donde operamos. Bajo este pilar, hemos sido reconocidos por:

- The Sustainable Agriculture Program in Bolívar and Sucre (2015).
- The social engagement approach during the expansion of the port in Tolú (2018–2019), which received an award in 2020 for its positive impact on community relations.

Conserving Natural Capital

Due to the biodiversity present in our operational areas, COMPAS engages in responsible management of natural capital. We protect areas of both direct and indirect influence, safeguard local flora and fauna, and adopt preventive measures to mitigate environmental impacts.

These experiences confirm that sustainable port management is not only possible—it is also a strategic advantage for the growth of the sector. The combination of operational efficiency, environmental commitment, and social value positions us as a leading example of port sustainability in Latin America. We will continue working with responsibility and long-term vision to consolidate clean and resilient logistics operations.

About COMPAS

COMPAS is a strategic player in the Colombian port sector and the only multipurpose port network in the country. It operates five terminals located in Cartagena, Barranquilla, Tolú, and two in Buenaventura. The company employs 489 people directly and generates opportunities for over 1,400 workers through port operators, suppliers, contractors, shipping companies, customs agencies, and maritime agents.

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COMPAS, Colombia

WORLD DAY FOR THE REDUCTION OF CO_2 EMISSIONS: DP WORLD CALLAO INVESTS OVER US$ 105 MILLION IN DECARBONIZATION STRATEGY

- ***In 2024 alone, the company reduced its total CO_2e emissions by 2,200 tons.***
- ***DP World Callao leads with best practices to build a cleaner future.***

Callao, January 2025 – Every January 28 marks the World Day for the Reduction of CO_2 Emissions, a date established by the United Nations (UN) to raise awareness about the impact of greenhouse gas emissions on the planet and to promote actions to reduce our carbon footprint.

The rise in CO_2 emissions leads to global temperature increases, which in turn cause sea level rise, extreme weather events, and biodiversity loss. This issue was at the center of discussions during the recent 2025 World Economic Forum held last week in Davos, Switzerland. Global leaders emphasized that while the shift to renewable energy presents a challenge for emerging economies, it also represents a tremendous growth opportunity. The World Day for the Reduction of CO_2 Emissions is therefore a call to action. Governments, businesses and individuals must work together to achieve a more sustainable world.

Globally, DP World has set a goal to reduce its emissions by 42% by 2030 and to reach net-zero emissions by 2050. In line with this, DP World Callao, which operates in Peru, is leading the logistics and port sector with an ambitious decarbonization plan launched in 2019. With a voluntary investment of over US$ 105 million, the company aims to reduce its Scope 1 and 2 emissions by 90% in Callao by 2030.

In 2024, the company reduced CO_2e emissions by 2,200 tons compared to the previous year—even with increased operations. This was achieved through innovative solutions to minimize environmental impact, including:

- **Energy matrix transition:** Since May 2023, the terminal has been powered by 100% clean energy through renewable energy providers and on-site solar generation. This shift is certified by the international I-REC standard, ensuring that the electricity used by equipment is entirely CO_2e-free, avoiding 6,300 tons of emissions.

- **Electric vehicles:** DP World Callao invested in electric trucks for container transport within the terminal, replacing traditionally diesel-powered vehicles. It also built Latin America's first electric charging station at a port terminal. In 2024, its fleet of 20 electric trucks prevented over 1,490 tons of CO_2 emissions.

- **Electric equipment:** The company purchased 3 ship-to-shore cranes and 12 yard cranes powered entirely by electricity for its newly inaugurated expansion. Additionally, it converted 10 diesel-powered rubber-tired gantry cranes (RTGs) to electric, investing US$ 1 million. Combined with 12 already electric RTGs, this avoided over 3,900 tons of CO_2e emissions in 2024.

- **Process efficiency and digitalization:** In recent years, DP World Callao has optimized its operational strategies and implemented digital platforms to reduce internal movements and enhance overall efficiency.

"The goal of any company is to continue growing, but that growth should not come at the expense of the climate. That's why we're investing in our decarbonization strategy to reduce Scope 1 and 2 emissions in Callao by 90% by 2030, aligned with our global reduction target of 42%," said Sany Rodríguez, Senior Director of Safety, Sustainability, and Environment at DP World Callao.

To continue with this commitment, suppliers will be involved through a training plan that will enable them to measure their carbon footprint and decarbonize their processes. They also plan to work with their customers to optimize operational efficiency, which will reduce service times and, consequently, the emissions generated while their vessels are moored at the docks.

The experience of DP World Callao proves that decarbonization, through CO_2e emissions reduction, is an achievable goal. More importantly, it demonstrates the critical role that companies can play as agents of change in the fight against climate change.

DP World Callao, Peru

ENVIRONMENTAL PROTECTION AT EMPRESA PORTUARIA QUETZAL: COMMITMENT TO SUSTAINABILITY AND CLIMATE CHANGE ADAPTATION

Empresa Portuaria Quetzal, as a key driver of maritime trade in Guatemala, bears great responsibility in environmental protection. In a world where sustainability has become a priority, it is essential that port operations adopt eco-friendly practices to minimize their environmental impact.

Environmental Impact of Port Operations

Port activities can affect the environment in various ways, including:

- Water pollution from hydrocarbon spills and industrial waste.
- Gas emissions from ships and port machinery.
- Generation of solid and hazardous waste.
- Alteration of coastal ecosystems, impacting biodiversity.

Environmental Protection Strategies

To address these challenges, Empresa Portuaria Quetzal implements a variety of strategies:

1. Waste Management:In compliance with Government Agreement 164-2021 (Regulations for Integrated Management of Solid Waste), all activities generating solid waste must separate it at the source according to its classification (organic, inorganic, recyclable) until its final disposal. The port also complies with Annex V of MARPOL, which sets rules to prevent pollution caused by ship-generated garbage. Annually, the port collects an average of 600 to 700 m^3 of waste from docked ships and 800 to 900 m^3 of solid waste from administrative and operational activities.

2. Emissions Monitoring and Control: Empresa Portuaria Quetzal conducts air quality monitoring every four months according to WHO guidelines and US EPA standards. Greenhouse gas emissions are naturally absorbed by green areas within the port's property—337 hectares of mixed forest and 5,831.80 m^2 of gardens and reforested areas. These capture an average of 4,092.19 tons of greenhouse gases per year, exceeding the emissions produced by logistical operations, human resources, and fossil fuel-powered machinery by 37%.

3. Efficient Water Use: The quality of drinking water is regulated by the COGUANOR NGO 29001 standard, as is the rational use, treatment of wastewater from administrative activities and EPQ operations, in compliance with Governmental Agreement 236-2006, Regulation of discharges and reuse of wastewater and sludge disposal, treating a monthly average of 5,163. 35 m^3/month of wastewater in 2 oxidation lagoon systems, the product of domestic use of EPQ's activities, and with an extraction of liquid waste from ships docking at the commercial dock of approximately 822 m^3 per year, which are treated and disposed of.

4. Biodiversity Protection: The port restores ecosystems through reforestation efforts in collaboration with the National Forestry Institute (INAB) under the "Sembrando Huella" program. Natural resources are protected from human harm, including unauthorized logging and illegal hunting, through security patrols across the port's property. These actions foster a conservation-minded culture within the port.

5. Environmental Education and Awareness: In collaboration with the Training Department of the Ministry of Environment and Natural Resources (MARN) and the National Port Commission, Empresa Portuaria Quetzal trains workers and commercial partners on the importance of environmental sustainability. Topics include environmental education, solid waste management, environmental legislation, and climate change adaptation. As a result, employees and partners are increasingly committed to environmental stewardship.

Empresa Portuaria Quetzal: Committed to a Sustainable Future

Economic development must go hand in hand with environmental protection. Through responsible measures, Empresa Portuaria Quetzal aims to become a leading example of port sustainability in the region. The adoption of green technologies, collaboration with environmental organizations, and adherence to national and international regulations are critical steps toward achieving cleaner and more efficient operations.

Environmental protection is not only a duty but an opportunity to create a cleaner, safer, and more competitive port. Sustainability must be a strategic pillar in Empresa Portuaria Quetzal's ongoing evolution.

Empresa Portuaria Quetzal is proudly certified under ISO 14001, demonstrating its commitment to the environment through an effective environmental management system.

It is also the proud recipient of the "Green Port" seal issued by Bircham International University of Spain through the Escuela Superior de Ciencias Ambientales de Guatemala, an award that recognizes the company as an environmentally friendly logistics operator.

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Empresa Portuaria Quetzal, Guatemala

DREDGING FOR SUSTAINABLE INFRASTRUCTURE: THE PORT FOCUS

A dredge is a tool; one that is vital to the sustainable development of port infrastructure, as well as other responsible marine solutions. Dredging has shaped and manipulated the interface between land and water to support navigation channels to ports, coastal protection, flood risk management and infrastructure development.

In 2018, the International Association of Dredging Companies (IADC), in partnership with the Central Dredging Association (CEDA), gathered together the top experts in the fields of marine and inland water infrastructure to develop a comprehensive roadmap on how to achieve sustainable development. The result was the landmark publication, Dredging for Sustainable Infrastructure (DFSI).

The goal of this initiative was to move the dredging industry, its clients, and the other vital stakeholders involved, from the purely economic perspective towards all three pillars of sustainability: economic, social and environmental. Since then, this approach has been adopted in project sites across the globe.

Based on the DFSI philosophy, the sustainability of an infrastructure project can be increased by:

1. Increasing the overall value of the project through the range of services it provides;
2. Reducing costs associated with the project, where “costs” include all monetary and non-monetary (e.g. environmental impacts) costs and resources consumed by the activity; and
3. Balancing the distribution of value and cost among the social, environmental and economic domains over time.

Practical implications of DFSI

Vision and value creation

The overall value of a project can be increased if project proponents, dredging contractors and other stakeholders engage in up-front visioning to identify how more value can be created across the three pillars of sustainability. By focusing on developing social, environmental and economic value, conflicts with stakeholders can be avoided while also securing more project proponents, advocates and partners.

Adapting projects to nature

Dredging changes the physical environment, producing features that would not occur naturally. For many years, hard engineering solutions, such as dams, dykes, and breakwaters were imposed on the physical environment without accurately estimating their effects on nature. However, this is changing. The Port community is in alignment with the dredging industry’s DFSI approach on the value of pursuing nature-based solutions.

The Green Port sets out goals related to sustainable dredging, which are primarily to keep the port’s nautical access open, clean and safe. At the same time, the goals aim to:

1. Manage integrated dredging activities to create opportunities for improving environmental quality and at the same time creating or enhancing ecosystems;
2. Manage dredged material according to the philosophy of minimising quantity, enhance quality, re-use with or without pre-treatment and long-term beneficial placement; and
3. Understand the local (and surrounding) environment and search for opportunities to use the natural processes including hydraulics, hydrology, geophysical, vegetation, benthos, etc. to maximise the efficiency of the dredging in both short and long-term.

Taking the long view

Pursuing sustainable port infrastructure requires taking a system-level view of a project to determine if it will be sustainable over the long term – meaning, if it will create enough value across the three pillars of sustainability relative to the investment needed to create that value. Such analyses may lead to some projects not being built, or existing ones being decommissioned in favour of more sustainable projects.

Guiding principles of dredging for sustainability

1. Comprehensive consideration and analysis of the social, environmental and economic costs and benefits of a project is used to guide the development of sustainable infrastructure.
2. Commitments to process improvement and innovation conserve resources, maximise efficiency, increase productivity and extend the useful lifespan of assets and infrastructure.
3. Comprehensive stakeholder engagement and partnering enhance project value.

Results of Dredging for Sustainable Infrastructure

Since the publication of the DFSI guidebook, significant progress has been made. The Board of Directors of IADC have tasked the association with promoting DFSI among all stakeholder groups, be that port authorities IGOs, academia, civil society or the general public. The ultimate aim is that contractors follow the approach as far as possible.

The IADC Secretariat works closely with its member companies to hold DFSI courses at locations across the world, where sustainability experts educate attendees from interested stakeholders and encourage adoption of DFSI.

In 2025, IADC launched the DFSI Magazine, which showcases the philosophy to a diverse audience, building awareness among those less familiar with the technical side of the dredging industry. IADC will build on this even more in the second half of the year, launching a DSFI website, which is intended to be the ‘go-to’, publicly-available resource for information on the industry’s commitment to DFSI and the inspiration for clients, project decision makers and the public at-large.

International Association of Dredging Companies (IADC)
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SUSTAINABLE INNOVATION IN MEXICAN PORTS

Since 2017, Maritime Procurement Services (MPS) has undertaken an innovative project focused on the responsible management of waste generated by the maritime industry, with an emphasis on converting sludge—an oily residue produced during maritime operations—into an alternative fuel with high energy value. This initiative began at MPS's treatment plant in Guadalajara, Jalisco, and was later expanded to Ensenada, Baja California, with the goal of reinforcing the company's environmental commitment through solutions that incorporate principles of circular economy and operational sustainability.

Traditionally considered a complex and costly waste to manage, sludge undergoes a treatment process that allows for the extraction of usable combustible fractions. The result is a product that can partially replace the use of fossil fuels such as light fuel oil, industrial diesel, or LP gas. Through this strategy, MPS aims to directly contribute to the reduction of greenhouse gas (GHG) emissions—an objective aligned with global climate action goals—while promoting circular economy by regenerating fuel from marine waste.

A technical analysis conducted in 2024 using the GHG Protocol methodology of the World Resources Institute (WRI) quantified the positive environmental impact of MPS fuel compared to virgin fuel options. Using an attributional approach that considers emissions generated during the well-to-tank (WTT) phase (i.e., those associated with extraction, refining, transportation, and distribution of fuels), it was determined that MPS's alternative fuel emits significantly less CO_2 equivalent per liter. At the Guadalajara plant, for instance, emissions were recorded at just 0.110 CO_2e/liter. Compared to traditional fuels, WTT emissions were estimated to be reduced by 82% to 95%, depending on the reference fuel type and specific plant. These figures mark a significant advancement for the Mexican industry, historically reliant on carbon-intensive fossil fuels.

One of the most noteworthy aspects of this innovation is that MPS fuel does not compromise industrial energy efficiency. According to laboratory studies conducted by external entities, the calorific value of the alternative fuel reaches 10,485 Kcal/kg—41.36% higher than petroleum coke and slightly higher than light fuel oil (+1.91%). While it falls slightly below industrial diesel and LP gas in terms of energy density, the difference is marginal and offset by its positive environmental impact. In simulated scenarios of thermal energy demand, MPS fuel supports the operation of industrial processes with similar energy requirements as conventional fuels, but with a significantly smaller carbon footprint.

This model has already begun to be implemented in collaboration with high-consumption companies, integrating the alternative fuel into their operations as part of a long-term sustainability strategy. The impact of this practice not only improves the environmental profile of user companies but also transforms the paradigm of port waste management—from a disposal model to one of energy valorization. Through its application in ports such as Ensenada and Guadalajara, MPS demonstrates that it is possible to develop local solutions with global impact, reducing pressure on marine ecosystems and cutting GHG emissions without affecting industrial competitiveness.

The MPS experience represents an exemplary case of technological and environmental innovation applied to port management. Its approach combines operational efficiency with climate commitment, driving the transition toward a cleaner and more resilient economy. In a context where the maritime industry faces increasing regulatory and social pressure to reduce its environmental impact, this type of solution becomes not only desirable, but necessary. The success of this alternative fuel derived from sludge validates that sustainability and productivity are not mutually exclusive goals, but rather the two pillars of a truly responsible port future.

Camila Sias, Sustainability Specialist

EMPORNAC – PUERTO SANTO TOMÁS DE CASTILLA – GUATEMALA

At the Empresa Portuaria Nacional Santo Tomás de Castilla (EMPORNAC), we reaffirm our commitment to protecting and preserving the environment. Through concrete, measurable, and sustainable actions, we aim to integrate environmental management into all our operations.

Port Environmental Certification: A Lasting Commitment to Continuous Improvement

Since 2010, EMPORNAC has held an environmental certification granted by an accredited external body, which has been renewed annually following rigorous audits that verify our compliance with environmental standards. This demonstrates our transparency and ongoing commitment to regulatory compliance and continuous improvement.

As such, we maintain our ISO 14001:2015 international certification, strengthening our Environmental Management System and ensuring that our operations are carried out in accordance with internationally recognized best practices.

Type A Environmental License: A Significant Legal and Environmental Endorsement

We are proud to announce that since March 18, 2022, EMPORNAC has held a Type A Environmental License, issued by the Ministry of Environment and Natural Resources (MARN), in accordance with Resolution No. 01463-2022/DIGARN/CGCA/CEMG. This license represents the highest-level environmental authorization in Guatemala and ensures that our port activities are subject to strict environmental controls and in full compliance with current legislation. The license remains valid until April 4, 2027.

Office Paper Recycling Plan: Results That Make an Impact

As part of our efforts to promote a circular economy, we launched the Office Paper Recycling Plan in June 2023. Thanks to the participation of our staff, we have collected over 5.39 tons of recycled paper, significantly reducing waste generation and promoting efficient resource use.

This effort not only reflects our commitment to sustainability but also aims to raise awareness among staff about the importance of their daily actions in protecting the environment.

Ongoing Environmental Supervision: Ensuring Compliance and Environmental Protection

The Environmental Management Department maintains constant oversight of port activities, verifying compliance with national environmental regulations, such as the Governmental Agreement 164-2021 for the proper classification of solid waste. This supervision also includes monitoring potential impacts on local biodiversity and promoting best environmental practices among port concessionaires and users.

EMPORNAC Making a Mark: Environmental Volunteering and Clean-Up Days

Through the "EMPORNAC Making a Mark" program, clean-up days have been organized in port areas and neighboring communities. These events involve company employees, government institutions, students, and community leaders. These efforts not only help keep the environment clean but also strengthen community bonds and promote environmental education from a participatory perspective.

Environmental Awareness from Within: Internal Awareness Campaigns

The Public Relations Department continually promotes environmental awareness campaigns through internal social media, newsletters, and training activities. These initiatives aim to foster an organizational culture with strong ecological values, where every team member becomes an agent of change both inside and outside the port.

Environmental Diploma Program with a Focus on Climate Change

We are encouraging all our staff to participate in the Environmental Diploma Program with a focus on Climate Change, which will be delivered by the National Port Commission of Guatemala, the designated authority on port matters in the country.

Moving Forward Together

We reaffirm that sustainability is a shared responsibility. We are deeply grateful to every employee, institutional partner, supplier, and community member who joins this green vision. Let us continue working together to build a cleaner, more modern, efficient, and environmentally responsible Puerto Santo Tomás de Castilla—for the well-being of present and future generations.

EMPORNAC, Guatemala

NAVIGATING THE CLIMATE-SECURITY NEXUS: THE ROLE OF THE PORT-MARITIME SECTOR ENERGY TRANSITION IN ENHANCING GLOBAL SECURITY

Climate change isn't just an environmental concern, it's a profound security crisis. Its escalating impacts—from extreme weather to rising sea levels—threaten human lives, fragile ecosystems, and the bedrock of our global economy. As these threats intensify, a crucial player in the global trade network, the port-maritime sector, is stepping up to address them, not just for the planet, but for our collective security. This issue isn't about minor adjustments; it's about a fundamental transformation. The port-maritime sector, a significant contributor to greenhouse gas emissions, is undergoing an industry-wide energy transition. But what does this mean for global security? Can transforming our ports truly make the world safer?

Port-Maritime Energy Transition

Maritime shipping is the lifeblood of global trade, moving everything we consume and produce. Yet, this vital industry relies heavily on fossil fuels. Traditional port operations—the trucks, ships, and massive cranes—are powered by diesel, contributing roughly 5% of global emissions when accounting for shipping, warehousing, and terminals. Unchecked, these emissions could surge by 50% by 2050, which is why it is imperative to align with the International Maritime Organization's (IMO) zero-emissions strategy known as Port Energy Transition (PET).

Imagine ports not as smoky, diesel-fueled hubs, but as vibrant centers of green energy. PET means transforming these critical nodes from fossil fuel guzzlers into efficient users of renewable energy and green fuels. More than that, ports must become energy hubs themselves—producing and supplying clean fuels like hydrogen, ammonia, methanol, ethanol, and biodiesel for both ships and land transport. This transformation isn't just about cleaning up port operations; it's about fundamentally decarbonizing the entire shipping and logistics chain. Ports must serve as platforms for energy generation, transportation, and transformation.

The Ripple Effect: Impacts of Going Green

The energy transition in ports causes a multifaceted array of impacts, presenting both exciting opportunities and formidable challenges. On the material front, one of the most immediate benefits is a significant reduction in our reliance on fossil fuels and a boost in energy efficiency. By transitioning to renewable energy sources and optimizing consumption with technologies like onshore power supply, port operations become remarkably more efficient. This not only reduces environmental impact but, in the long run, also lowers operational costs for port operators. Furthermore, PET will also decrease local air and water pollution. Traditional port operations often involve the handling and potential spillage of fossil fuels, leading to air and water pollution. By transitioning to cleaner energy sources, PET significantly reduces these localized environmental impacts, improving air quality for nearby communities and minimizing the risk of oil spills and their associated ecological damage. However, the electrification of port equipment and the

integration of renewable energy sources will inevitably increase the demand for electricity. This increased demand can strain existing grid infrastructure, potentially leading to power shortages or the need for significant investments in grid upgrades to accommodate the growing energy needs of the port sector.

Economically, the shift to renewable energy and the development of related infrastructure will create new jobs in sectors such as renewable energy installation, maintenance, and operation, among others, which can stimulate economic growth in port cities and surrounding regions. Additionlly, PET can foster economic growth by attracting investment in green technologies and infrastructure, creating new businesses and industries, and enhancing the competitiveness of ports in the global supply chain. Yet, this transition requires substantial upfront capital. Installing new renewable energy systems, building charging stations for electric vehicles, and upgrading grids all come with a hefty price tag. These investments can be a significant financial burden for port operators, particularly for developing nations that may lack easy access to such capital.

Politically, PET can serve as a catalyst for improved international cooperation on decarbonization efforts. By sharing successful practices, technologies, and knowledge, countries can collectively accelerate the transition to a low-carbon maritime sector. However, this very transition could also spark geopolitical competition among countries to secure access to critical minerals used in battery production such as lithium, cobalt, and rare earth, potentially creating tensions and trade disputes. Moreover, differing national policies and regulations regarding decarbonization and the use of green technologies can create trade barriers and disputes between countries. For example, countries with stricter environmental regulations may impose tariffs or other trade restrictions on goods imported from countries with less stringent standards.

Global security and its connection to the Energy Transition

Global security extends beyond the traditional military concept. It encompasses three crucial dimensions: Environmental Security, avoiding climate change impacts and ensuring clean water and air; Economic Security, ensuring stable and reliable energy supplies and promoting economic growth and development; and Human Security, protecting human health and well-being from environmental and economic disruptions.

The decarbonization of the port-maritime sector through PET contributes to climate change mitigation, reducing the risk of extreme weather events, sea-level rise, and disruptions to global supply chains which all present a threat to the three dimensions of security mentioned above. By reducing emissions, PET helps to improve public health in port cities by increasing air and water quality, contributing to human security. Additionally, reliance on renewable energy sources can reduce dependence on volatile fossil fuel markets, enhancing economic/energy security.

While PET holds immense promise for increasing global security, it also presents potential security challenges. Geopolitical tensions could indeed arise from the aforementioned competition for critical minerals. A rapid energy transition might lead to job losses in certain sectors and economic hardship for some communities. Crucially, an over-reliance on a single energy source, primarily electricity, creates vulnerabilities. If the grid becomes unstable or is targeted by cyberattacks, natural disasters, or geopolitical disruptions, the consequences for vital supply chains and overall security could be severe.

The "it depends" factors and uncertainties

The transformative impact of Port Energy Transition on global security isn't a foregone conclusion; rather, it hinges on a complex interplay of critical factors. First and foremost, the pace and scale of this energy shift are paramount. While urgency is key, overly rapid transitions could lead to unforeseen disruptions across various sectors. Second, adequate grid modernization is absolutely essential for successful port electrification, demanding sufficient capacity and reliability in our power infrastructure. Third, international cooperation becomes an indispensable tool for mitigating geopolitical risks, fostering collaborative efforts in technology development, standardization, and seamless supply chain management across borders. Fourth, ensuring a fair transition for workers and communities impacted by this profound energy shift is crucial for maintaining social and political stability. Finally, continuous technological advancements in areas like battery technology, energy storage solutions, and new renewable fuels will profoundly shape the future trajectory and success of PET.

Uncertainties further complicate the picture. Unpredictable global events such as conflicts, trade wars, and shifts in international alliances can dramatically disrupt supply chains, destabilize energy markets, and reshape the entire global security environment. Beyond these external shocks, the success of PET is also deeply reliant on public acceptance and sustained political support. A lack of either could lead to significant social movements against the transition, ultimately influencing its implementation and, by extension, its impact on global security.

A Secure Future, One Green Port at a Time

The energy transition within the port-maritime sector presents a critical opportunity to enhance global security by mitigating climate change and its associated risks. By decarbonizing port operations and fostering the development of green maritime transport, PET stands to contribute significantly to environmental security by reducing greenhouse gas emissions, mitigating climate change impacts, and improving air and water quality. This transition can also bolster economic security by reducing dependence on volatile fossil fuel markets, promoting the growth of renewable energy sectors, and fostering economic development in port cities. Furthermore, PET can contribute to human security by improving public health in port communities and reducing the risks associated with climate change impacts, such as extreme weather events and sea-level rise.

However, realizing the full security potential of PET requires careful consideration of several key factors and navigating inherent uncertainties. A well-planned and gradual transition, coupled with robust grid modernization, is crucial to minimize disruptions and ensure the successful integration of renewable energy sources. International cooperation is not just beneficial, but essential to effectively address the challenges of technology development, standardization, and supply chain management, while ensuring a fair transition for workers and communities is paramount for social and political stability.

Ultimately, the success of PET in enhancing global security hinges on proactive policymaking, effective international collaboration, and a commitment to mitigating the potential risks while maximizing the benefits of this critical transition.

Sabina Malnis, Inter-American Committee on Ports, Organization of American States

GUAYAQUIL PORT TERMINAL COMMITTED TO SUSTAINABILITY AND CARBON NEUTRALITY

In a global context where environmental sustainability has become imperative for all industries, the Guayaquil Port Terminal (TPG) marks a turning point in port operations in the country. The terminal has achieved carbon neutrality, establishing itself as one of the environmental leaders in Ecuador's logistics and port sector.

Through a rigorous technical verification process, in accordance with international standards ISO 14064-1:2018 and ISO 14068-1:2023, TPG was officially recognized as a carbon-neutral organization by SGS Ecuador. This achievement covers operations carried out between January 1 and December 31, 2022, and confirms the terminal's efficient and responsible environmental management.

The process included full coverage of Scope 1 and 2 emissions, as well as quantified and verified Scope 3 categories. Thanks to the optimization of fuel consumption in port equipment and the incorporation of low-emission technologies, TPG significantly reduced its environmental footprint. For the remaining emissions, the terminal acquired Certified Emission Reductions (CERs), thus completing its transition to carbon-neutral operations.

"At TPG, we are convinced that port development must go hand in hand with environmental stewardship. Achieving carbon neutrality is a solid step toward our vision of becoming a more sustainable port," said Luisenrique Navas, General Manager of TPG.

National Recognition: Ecuador Zero Carbon Program

The Ministry of the Environment, Water, and Ecological Transition (MAATE) of Ecuador granted TPG the Emission Quantification Seal and the Certification of Greenhouse Gas (GHG) Carbon Footprint Reduction as part of the Ecuador Zero Carbon Program. This recognition not only validates the systematic and transparent measurement of its emissions but also certifies the carbon footprint reduction achieved by the terminal, highlighting it as a key player aligned with national environmental policies and the transition to a low-carbon economy.

With these achievements, TPG positions itself as a sustainability benchmark, proving that it is possible to combine operational efficiency, logistics growth, and environmental responsibility. This recognition reinforces its commitment to continue implementing actions that reduce its ecological impact by integrating technological innovations, energy optimization, and environmental best practices in every stage of its operations.

Wendy Silva, TPG, Ecuador.

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