



**Georgia Tech Panama**  
Logistics Innovation & Research Center



Regional Hub for the  
**Automotive Industry**



# Driving Efficiency: Panama as a Hub for the Automotive Industry

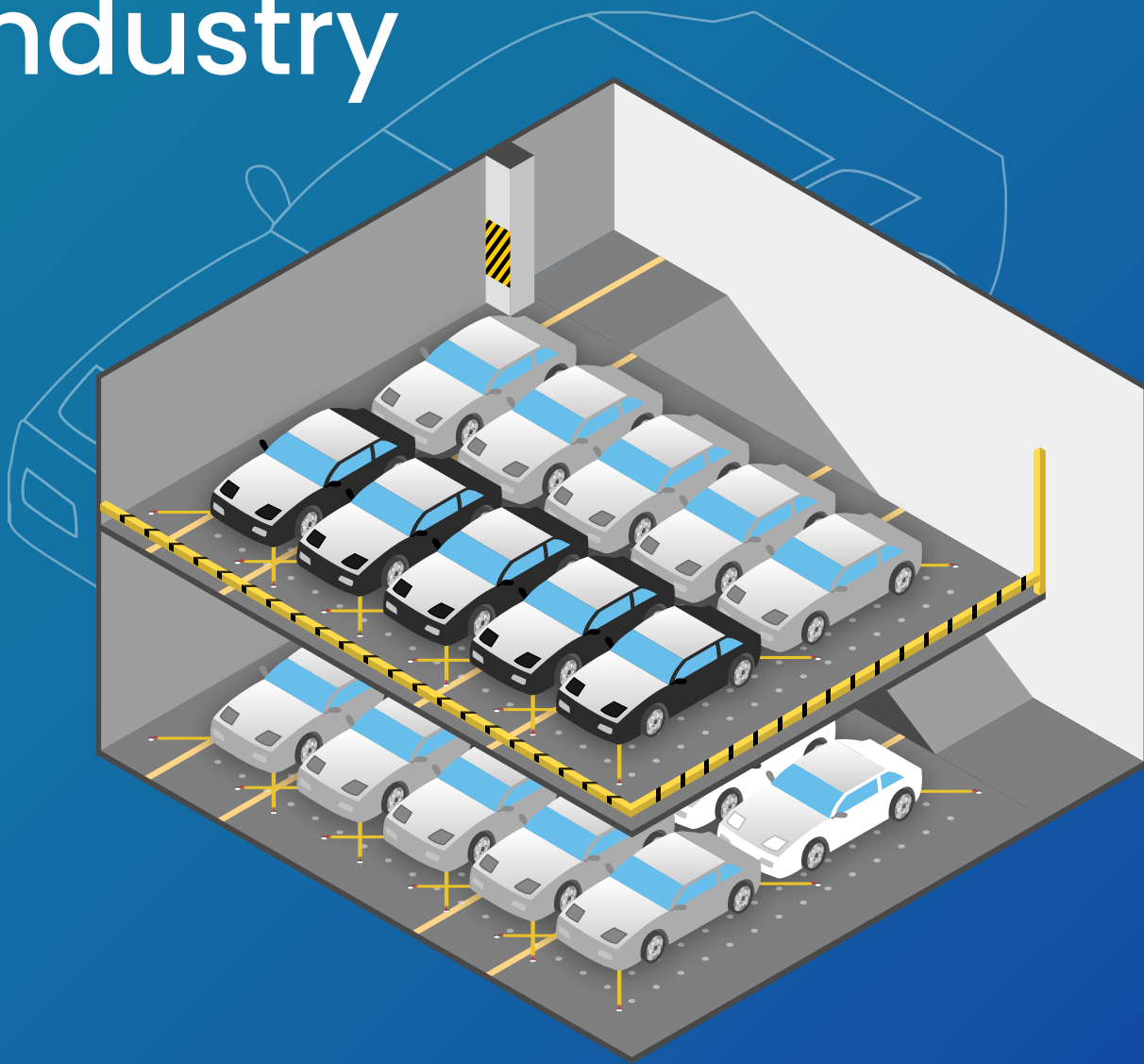
Prepared by: Angela Agudelo

Georgia Tech Panama Logistics Innovation and Research Center

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## Coming expectations

Recent publications of these series have highlighted how Latin America is consolidating itself as a region of great attraction for the global automotive industry. This trend is driven by economic growth, technological advances and a constantly evolving consumer market. The region's demand spans a wide range of vehicles, both combustion and electric models, due to the renewal of an aging vehicle fleet –averaging 10 years– and the rise of popularity of SUVs and Pick-Ups –thanks to their greater interior space, versatility and adaptability to different terrains and conditions–. Additionally, electric and hybrid vehicles are gaining traction as a result of the transition to sustainable and low emissions mobility, and the greater customization and technology at an affordable cost. <sup>[1][2]</sup>

In general, the sale of electric vehicles in Latin America obtained the following panorama <sup>[3]</sup>:

- In **Mexico**, sales of electric vehicles in the first half of 2024 reached 8,643 units for electric vehicles, 2,520 for plug-in hybrids and 23,676 for non-plug-in hybrids.
- **Costa Rica** recorded 1,372 electric vehicles sold through July 2024, bringing the annual total to 5,684 units.
- **Panama** reported a steady increase with 309 electric vehicles sold in the first seven months of 2024.
- In **Colombia**, sales of electric and hybrid vehicles increased by 45.1% compared to the first six months of 2023.
- **Ecuador** also showed significant growth, with a 96.5% increase in electric vehicle sales.
- **Peru** and **Chile** saw increases in sales of electric and hybrid vehicles, while Argentina and Brazil also reported notable increases in their electrified vehicle markets.
- **Uruguay** recorded 900 electric vehicles sold in the first seven months of 2024.

## Sales of electric vehicles in Latin America

### MEXICO



2024  
8,643 electric vehicles sold.  
2,520 plug-in hybrids sold.  
23,676 non-plug-in hybrids sold.

### PANAMA



2024  
309 electric vehicles sold in the first seven months of 2024.

### ECUADOR



2024  
96.5% increase in electric vehicle sales compared to the first 6 months of 2023.

### COSTA RICA



2024  
1,372 electric vehicles sold through July, bringing the annual total to 5,684.

### COLOMBIA



2024  
45.1% increase in sales compared to the first 6 months of 2023.

### URUGUAY



2024  
900 electric vehicles sold in the first seven months of 2024.

## OTHER COUNTRIES FROM SOUTH AMERICA



Increases in electric and hybrid vehicle sales.



Notable increases in electrified vehicle markets.



Source: ALAMOS – Asociación Latinoamericana de Movilidad Sostenible [3]

Estimates suggest that the Latin American market will grow with a CAGR of 4.61% until 2029, with trends on the part of OEMs (Original Equipment Manufacturing) to revolutionize e-commerce. This includes enhancing connectivity and communication with consumers, allowing the optimization of services and the growth of sales of automotive parts. [4]

This approach of increasing production for the Latin American market as a result of the recovery of some economies, has been embraced by groups like Ford. They plan to increase the production of Ranger by 15%, responding to its high demand, mainly in the South American market. Similarly, Renault has announced an investment of \$350 million for the production of new models. Both manufacturers have operations in Argentina, highlighting the increased investment in the automotive industry in Latin America. [7]



Toyota's CEO for Latin America and the Caribbean points out that expectations for the Latin American market are good, expecting growth due to the recovery of some economies in the region. <sup>[5]</sup> Toyota's confidence in the market is reflected in the investment made in Brazil to expand vehicle production, with special focus on hybrids. This strategic focus addresses the region's current limitations in charging infrastructure for fully electric vehicles. <sup>[6]</sup>

Nissan announced that in its first year as a region —after the integration of Nissan Mexicana (NMEX), Nissan Importers Business Unit (NIBU) and Nissan South America (NSAM)—, sales increased by 6% compared to previous years. This indicates that its 2023–2025 investment plan to produce new SUVs and assemble engines is paying off. <sup>[8]</sup>

BYD (Build Your Dreams) and GWM (Great Wall Motor) have been part of the driving groups of electrification in the region. Since their arrival in the region, both companies have adopted production, logistics and distribution strategies designed to meet global demand while addressing local consumers' needs through investments and compliance with regional regulations. In 2021, GMW acquired a Mercedes-Benz plant in Brazil for the production of hybrid and electric vehicles. Similarly, in 2023, BYD acquired a plant with a production capacity of 300,000 vehicles per year. <sup>[9]</sup> It is expected to start production in 2025 with 150,000 vehicles, expanding to full capacity by 2026 to supply the South American market. <sup>[10]</sup>

Despite the positive outlook, the region faces notable challenges. Economic volatility, currency fluctuations, and inflation remain latent risks. Similarly, the industry must address supply chain vulnerability, such as: geopolitical conflicts, natural disasters, port congestions and border closures. The globalization of production complicates supply chain management, inventory management, among others.

These challenges are being countered by the implementation of a renewed focus on energy diversification and innovation in business models, such as vehicle subscription services and the expansion of

connected vehicles. In this context, this document explains how the industry would benefit from having Panama as a strategic point for its storage, distribution, and other value-added activities, and this will enable the industry to access more models and brands in Central American markets.

## Behind vehicle's international trade

Before we start exploring why a hub in Panama will benefit the industry, let us look at the importance of Ro-Ro (Roll on – Roll off) vessels for the transport of vehicles and their parts. Remember that some parts of heavy vehicles have international transport limitations due to their dimensions.

Ro-Ro cargo, or rolling cargo, refers to any cargo that is loaded or unloaded using road vehicles, wagons or vans, whether on their own wheels or additional wheels, by means of a land maritime transport ramp. <sup>[13]</sup>

The international trade of finished vehicles —both light or heavy— and their large components is made possible by Ro-Ro ships. Unlike conventional cargo ships, which embark (load) and unload the cargo by cranes, Ro-Ro ships facilitate the movement of wheeled cargo via ramps. Vehicles can be driven directly onto or off the ship, or wheeled cargo can be handled using specialized equipment such as trailers with wheels, heavy load trailers, multipurpose bogies among others. This method is not limited to auto parts; it also accommodates a diverse range of large cargo, including cargo of projects of wood, steel, large pipes, turbines, live animals, refrigerated cargo, among others. Also, some vessels are equipped with additional facilities to handle specific cargo, such as refrigerated sections for perishable cargo and specialized equipment to operate large machinery. <sup>[11][12]</sup>

Ro-Ro vessels can have up to 13 open decks, and function as a parking lot with lifting ramps that connect the decks. The cargo is placed on the most suitable deck according to its characteristics, weight, height,

length. Among the types of Ro-Ro vessels are <sup>[12][14]</sup>:

1. **Pure Car Carrier (PCC)**: designed solely for car transport.
2. **Pure Car and Truck Carrier (PCTC)**: designed for the transport of vehicles, trucks and other four-wheeler variants.
3. **Container ship + RoRo vessel (ConRo)**: they are a combination of container vessels and RoRo ships. These vessels can carry out the work of RoRo ships and traditional container vessels.
4. **General cargo ship + RoRo vessel (GenRo)**: general cargo ship equipped for RoRo installations. It is more compact and smaller compared to PPC, PCTC and ConRo.
5. **RoPax ships**: also called ferries, and they are designed for both, the transport of cars (automobiles, heavy machinery and other oversized cargo) and passengers on board the ship. These are commonly used over short distances through river docks.
6. **Complete RoRo vessel**: they have a load capacity of between 2,000 and 40,000 DWT <sup>!</sup>. These ships are equipped with both internal and external ramps, allowing seamless loading and unloading of cargo. Notably, Ro-Ro vessels lack hatches, a design choice that optimizes them for high-seas operations.



\*(Deadweight tonnage): refers to the load capacity, in metric tons, that a vessel can safely carry.

Ro-Ro transport operates under the framework of various international maritime laws and regulations, including the [International Convention for the Safety of Life at Sea \(SOLAS\)](#) and the [International Maritime Dangerous Goods Code \(IMDG\)](#). These regulations cover ship safety, cargo stowage, securing procedures and emergency response protocols. Additionally, compliance with the import and export customs regulations of both, the country of origin and destination, must be respected. Shipping lines providing Ro-Ro services must also adhere to environmental regulations, maintain high standards in ship maintenance, crew training and implement safety protocols. <sup>[15]</sup>

Among the shipping lines that provide the Ro-Ro transport service are: WALLENIUS WILHELMSSEN, UECC, K-LINE, NEPTUNE, GLOVIS, GRIMALDI LINES, HÖEGH AUTOLINERS, N.Y.K, FLOTA SUARDIAZ, FINNLINES, MITSUI O.S.K. These companies maintain diverse fleets of

Ro-Ro vessels dedicated to the transport service, ensuring a good service depending on their customers' needs. <sup>[16]</sup>

The year 2020 marked a challenging period for Ro-Ro transport, as the decrease in demand for personal vehicles led to an excess capacity of Ro-Ro vessels. However, with the resumption of vehicle purchases, the industry has struggled to meet the demand, particularly for large machinery, construction equipment and heavy vehicles. This imbalance has prompted a shift of the cargo normally shipped by Ro-Ro vessels to another type of transport, such as containerized transport or multipurpose vessels. <sup>[17]</sup>

Loading vehicles through containers is a viable solution, however, this one is reputed to cause more damage to vehicles than Ro-Ro transport. The European Vehicle Logistics Association (ECG) conducted a survey that concluded that damage to vehicle transport operations in Europe was up to ten times higher in the case of containers than in traditional Ro-Ro transport. To solve this problem, multiple companies have worked over the years to ensure safer and more efficient transportation. <sup>[18]</sup>

## **A. Sustainability and challenges in Ro-Ro transportation**

By the beginning of 2024, the global fleet of Ro-Ro ships was around 3,000 ships, with an average age of around 20 years. <sup>[19]</sup> Japan and the United States emerged as prominent shipowning nations. This fleet is increasingly incorporating ships powered by alternative technologies, such as Liquefied Natural Gas (LNG), methanol, batteries and hybrid electric propulsion. <sup>[20]</sup>

Despite advancements, Ro-Ro transport faces several limitations, including low capacity to meet current demand, changing market dynamics, political volatility, and the rising demand for renewable energy. The surge in demand is due to the high sales figures of electric vehicles from Chinese manufacturers that are demanding more Ro-Ro

vessels. Geopolitical tensions have also forced existing vessels to divert routes, increasing costs and delivery times. To address these issues, the industry is prioritizing the construction of new vessels with greater cargo capacity, and technology is being encouraged to optimize transport operations and provide more efficient, sustainable, and environmentally friendly vessels. <sup>[17]</sup>

An example of a sustainable Ro-Ro vessel is the [Aurora-class PCTC](#), designed by [Höegh Autoliners](#) and assembled by China Merchants Heavy Industry (Jiangsu) Co. Ltd. This multi-fuel PCTC is a key step towards decarbonizing maritime transports and its supply chains. It is going to be the first vessel to operate on zero-carbon ammonia, though it can also run on methanol. Höegh Autoliners makes around 3,000 port calls a year, and has an order for twelve of these vessels, with deliveries scheduled from the second half of 2024. The company has committed to operate at least 5% of its offshore operations on carbon-neutral fuels, and aims to achieve carbon neutrality across the company by 2040. <sup>[21][22]</sup>



To enhance its international logistics capabilities, particularly for maritime transport of plug-in vehicles, [BYD](#) launched the vessel [EXPLORER NO.1](#). Owned by the international shipping company Zodiac Maritime and leased exclusively to BYD, the vessel was launched on January 10, 2024, at Yantai Port in Shandong, China. It is equipped with a

dual propulsion system combining LNG and conventional fuel, underscoring BYD's commitment to sustainable shipping. With a remarkable cargo capacity of 7,000 vehicles, this vessel is the first of a planned fleet expansion. Over the next two years, BYD plans to launch seven more vessels, all equipped with advanced energy storage technology and axle-driven generator systems. <sup>[23]</sup>

In November 2024, BDY introduced two more ships owned by its OEM manufacturer group. The first, [BYD Hefei](#), was launched on September 20 and built by Guangzhou Shipyard International. The second, [BYD Changzhou](#), built by CIMC Raffles, departed the port to be delivered to BYD on November 29. Both vessels were named after BYD's factories. In November 2024, BYD sold 506,804 NEVs (New Energy Vehicles), marking a year-on-year increase of 67.86%. The company has sold a total of 3,757,336 NEVs in 2024, up 40.02% from 2023. In detail, BYD's sales of all-electric passenger vehicles in November 2024 were 198,065 units, while sales of plug-in hybrid vehicles were 305,938 units. Of the total sales, 30,977 units were sold overseas, with 28,141 exported directly from China. <sup>[24]</sup>

## B. Strategic flagging in maritime operations

In many cases, ships do not sail under the flag of their shipowner's country but instead adopt the flag of another nation through an administrative process known as **flagging**. This practice is often pursued to obtain various benefits, such as reduced taxes, lower registration fees, preferential transit conditions, negotiations or other maritime activities. <sup>[25]</sup>

Among the leading non-shipowner countries with the most flagged vessels are: Panama, the Marshall Islands and Liberia. Until November 25, 2024, Panama registered the flagging of 358 ships that were added to the list of more than 8 thousand flagged vessels. This fleet includes cargo ships, tankers, passengers, tugboats, fishing boats, drills, yachts, among others. With a total of 243.1 million GT<sup>!</sup> as of June 2024, Panama reaffirmed its position as a global leader in ship flagging. <sup>[26][31]</sup>

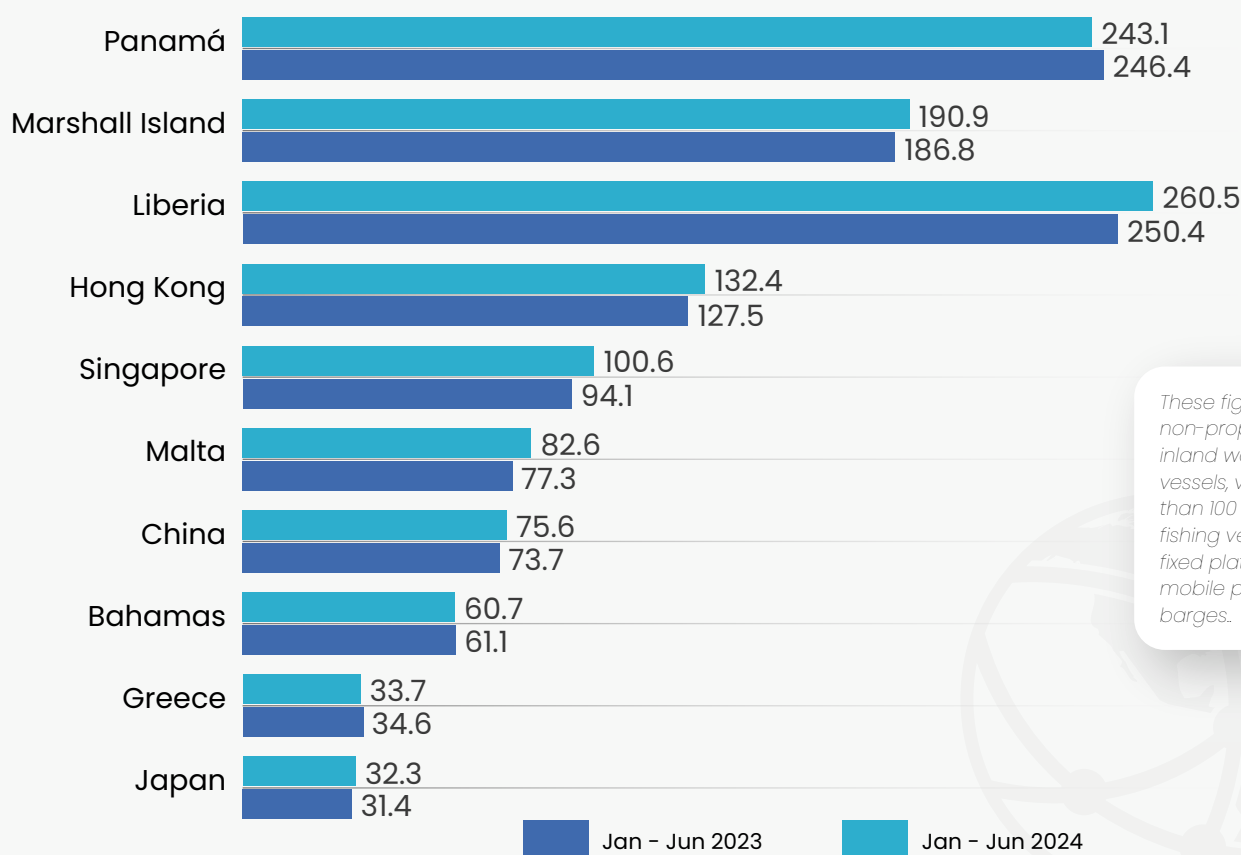


\*(Gross Tonnage): it is the measurement that determines the size (volume) and cargo capacity of a ship.



## Gross Tonnage of Vessels

(In million gross tonnage) <sup>[31]</sup>



Source: IHS Global SAS and IHS Global LT.

## C. Infrastructure and efficiency in Ro-Ro transport

Ro-Ro transport depends on the port infrastructure, which must be equipped to facilitate safe and efficient loading and unloading processes. Essential infrastructure includes ramps, parking spaces and secure storage areas. The key advantages of this type of transport include reduction of waiting times in ports, high profitability, versatility by allowing a wide variety of cargo, minimal risk of damage, and greater efficiency.

To ensure safe loading and unloading, the ship must dock parallel to the dock, so that the ramp that coincides with the level of the dock is

lowered. After loading the cargo, it is attached to the deck of the ship to prevent it from moving during transport. The personnel to handle this type of cargo must receive adequate training to ensure the safety of the cargo in the shipment, transport and disembarkation. Efficient disembarkation processes contribute to fast turnaround times, reduced port congestion, and timely deliveries.

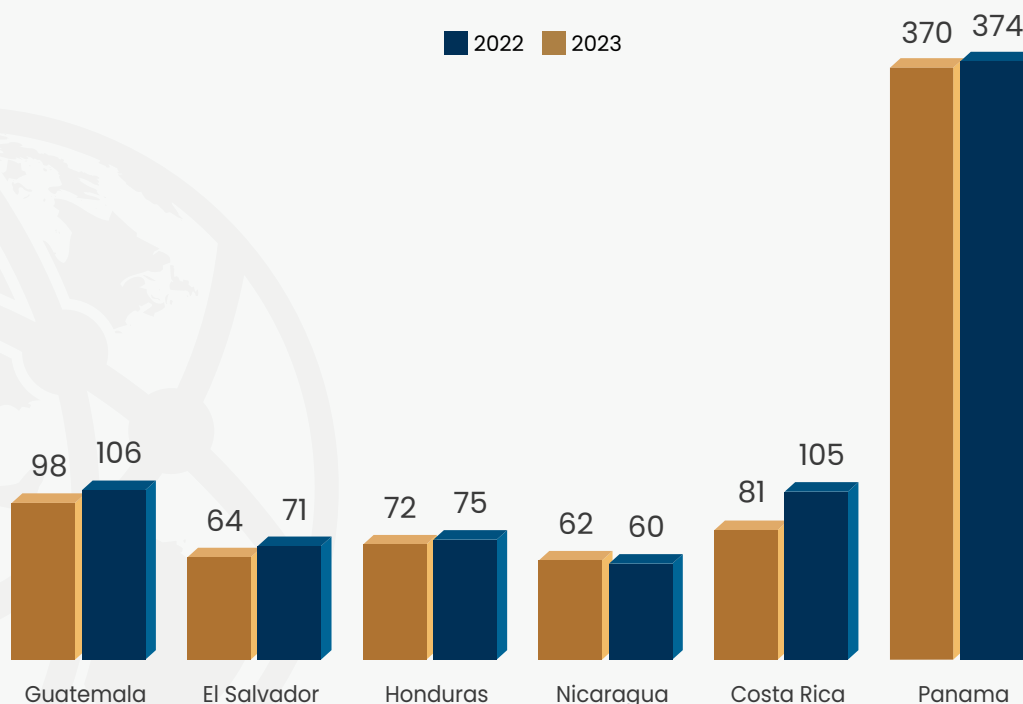
Globally, many countries have one or more ports with adequate infrastructure for the arrival and berthing of Ro-Ro ships, enabling smooth handling of roll-on cargo. Within Central America, according to data from the Central American Maritime Transport Commission (COCATRAM), made up of Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama, Panama stands out as a leader in Ro-Ro cargo operations in 2023. Panama recorded a total mobilization of 605.4 thousand tons<sup>!</sup> of cargo, registering the arrival of 374 Ro-Ro ships in 2023. <sup>[13]</sup>



\*Metric ton: unit of mass equivalent to 1000 kg (approximately 2,500 pounds).

### Total Comparison of Ro-Ro Ships Arrived in the Different COCATRAM Countries

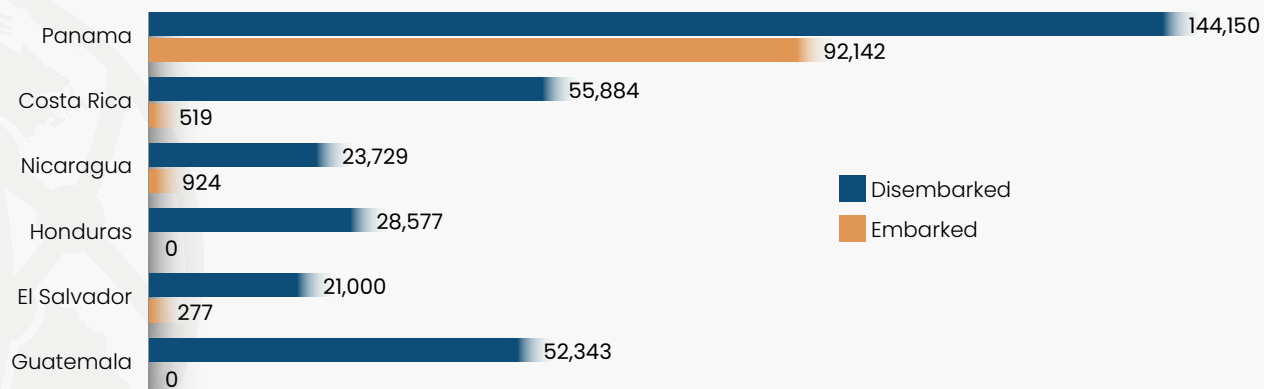
(In units)



Source: COCATRAM. "Resumen estadístico Portuario" [13]

### Number of Vehicles Embarked and Disembarked by the Countries that Make Up COCATRAM

(In units)

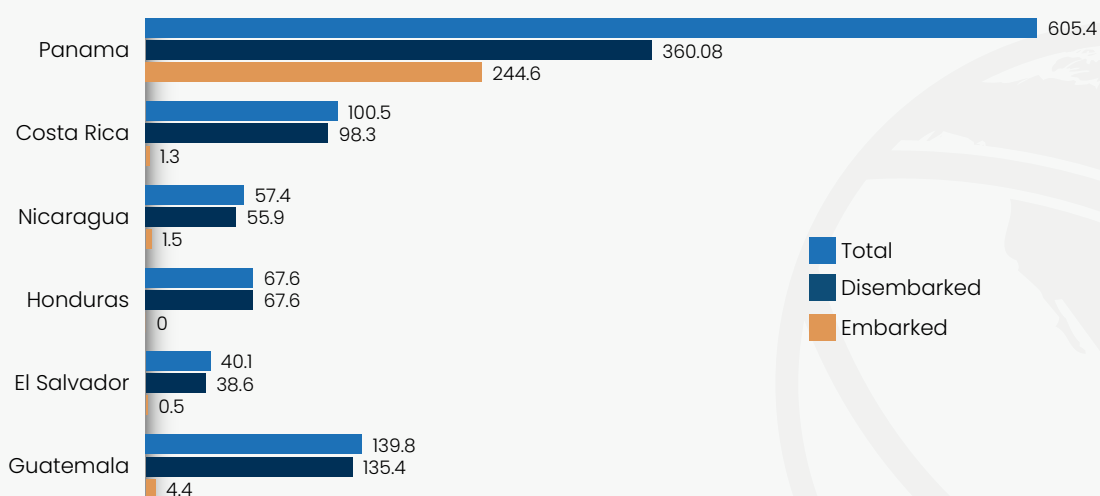


Source: COCATRAM. "Resumen estadístico Portuario" [13]

According to COCATRAM, approximately 419,617 vehicles were mobilized in Central America in 2023. Of this total, 325,638 units were vehicles disembarked, while the remaining 93,862 units were embarked. Of the total disembarkments, Panama accounted for around 44%, followed by Costa Rica with 17% and Guatemala with 16%. Regarding the embarkments, neither Guatemala nor Honduras registered any movements. El Salvador, Nicaragua, and Costa Rica each had less than 1% participation, while Panama represented 98% of the disembarkment movements. [13]

### Total rolling cargo moved in 2023 by the Central American countries that form the COCATRAM

(In million tons)



Source: COCATRAM. "Resumen estadístico Portuario" [13]

Ro-Ro cargo accounted for less than 1%, with 1 million metric tons, compared to the total cargo handled by the region's ports in 2023. The ports that stood out in cargo mobilization were Manzanillo International Terminal (Panama) with 48.2%, Panama Port Company (Panama) with 11.5%, and Quetzal (Guatemala) with 11.4%. <sup>[13]</sup>

## Industry scenario lately in Panama

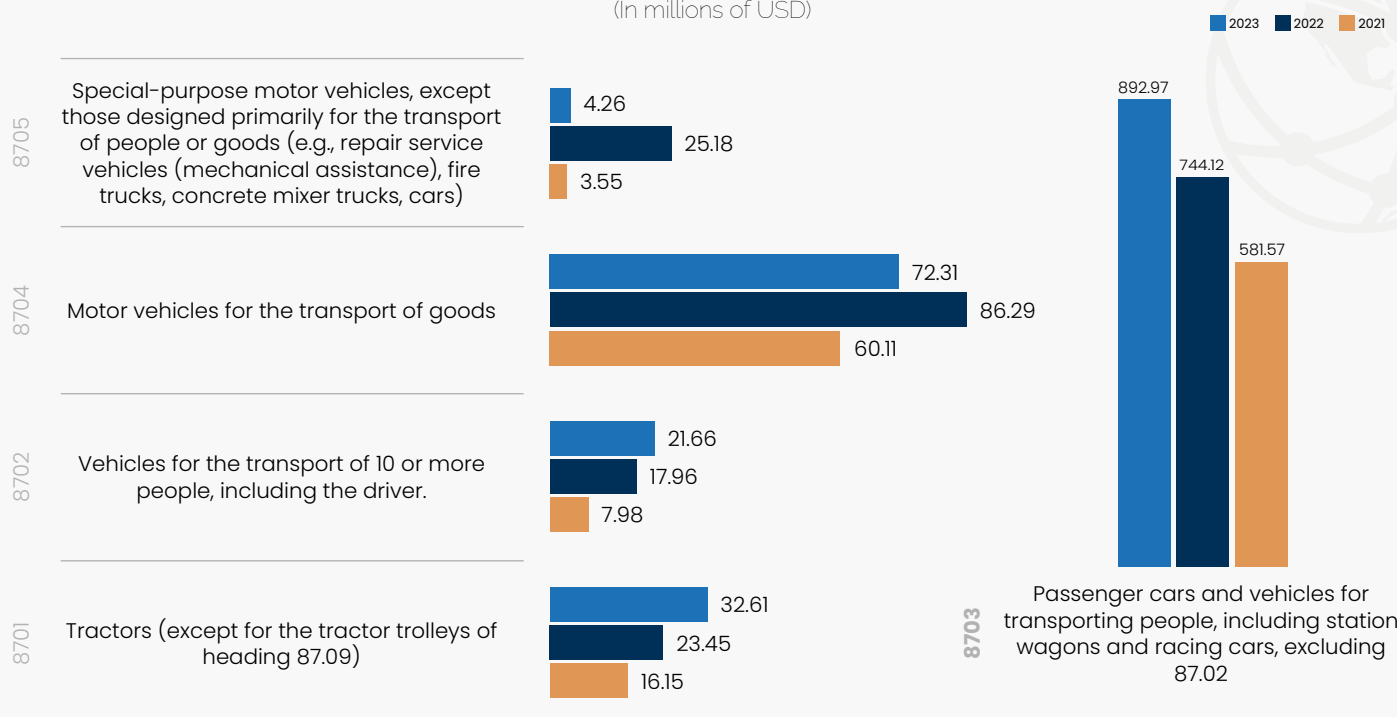
In 2023, the vehicle market in Panama closed with sales figures of 48,919 units, representing an increase of 16% compared to 2022 <sup>[27]</sup>:

- SUVs totaled 24,232 units.
- Pickups 7,235 units.
- 441 electric vehicles.

In August 2024, there was a sales growth of 10% compared to 2023. This suggests average monthly sales of 4,400 vehicles, with 35,349 new vehicles, being 434 units of electric vehicles. <sup>[28][29]</sup>

### Imports of finished vehicles in Panama

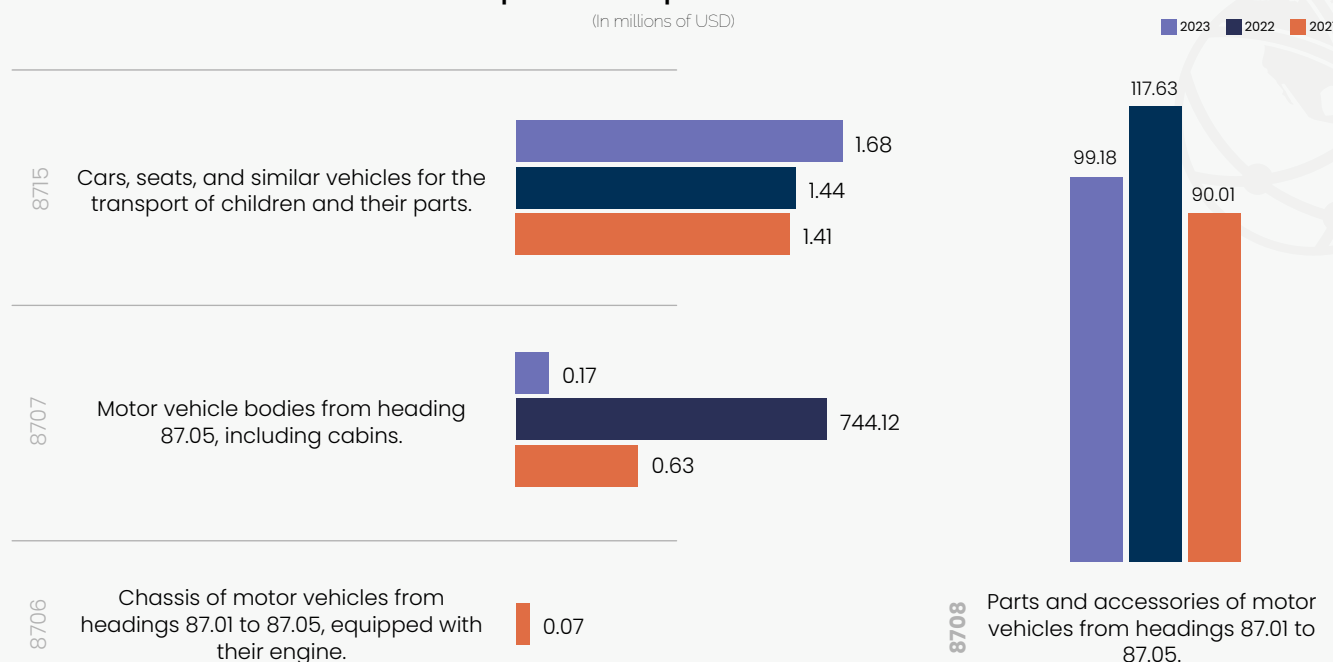
(In millions of USD)



Source: INEC Panama – “Value (in balboas) of the import to Panama, per year, according to tariff description” <sup>[77]</sup>

### Imports of Auto parts in Panama

(In millions of USD)



Source: INEC Panamá - "Value (in balboas) of the import to Panama, per year, according to tariff description" [77]

## A. Competitive port rates

Port taxes in Panama are overseen by the Panama Maritime Authority, which has established standardized and competitive rates to ensure consistency across the sector.

These charges apply to various port operations, including stowage, storage, and dockage fees, as detailed below <sup>[34]</sup>:

- Stowage or unloading of vehicles is B/.25.00 per unit and of containers of B/. 60.00 per TEU.
- For storage allowances, cargo in transit has storage permit for up to 30 calendar days, and import and export cargo 5 business days.
  - If the free storage period is extended, B/. 10.00 per vehicle per day; containers or cargo on chassis B/. 25.00 per TEU and B/. 20.00 buses, chassis, trucks and other similar vehicles and machinery.
- The dockage fees (cargo transfer) correspond to B/. 30.00 per unit and B/.40.00 per TEU.

## B. Port infrastructure and expertise

Panama has five ports specialized in containerized cargo, including three terminals on the Atlantic side —SSA Marine MIT, Colón Container Terminal (CCT) and Cristobal— and two terminals on the Pacific side —Balboa and PSA Panama International Terminal—. Together, these ports handled 8.32 million TEUs<sup>!</sup> and received 374 Ro-Ro vessels in 2023, with 153 arriving by June 2024.<sup>[30][31]</sup>

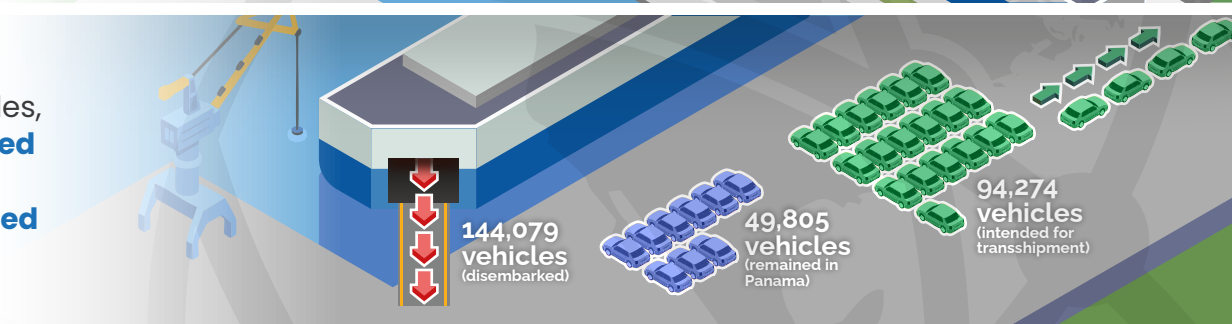


TEUs: A unit of measurement used in foreign trade to calculate the carrying capacity of containers, 1 TEU (Twenty-foot equivalent unit) is a container that is 20 feet long, 8' 0" wide, and usually 8' 6" high. In metric terms, a TEU is 6.10 meters long, 2.44 meters wide, and 2.59 meters high. A 40-foot container is equivalent to 2 TEUs.

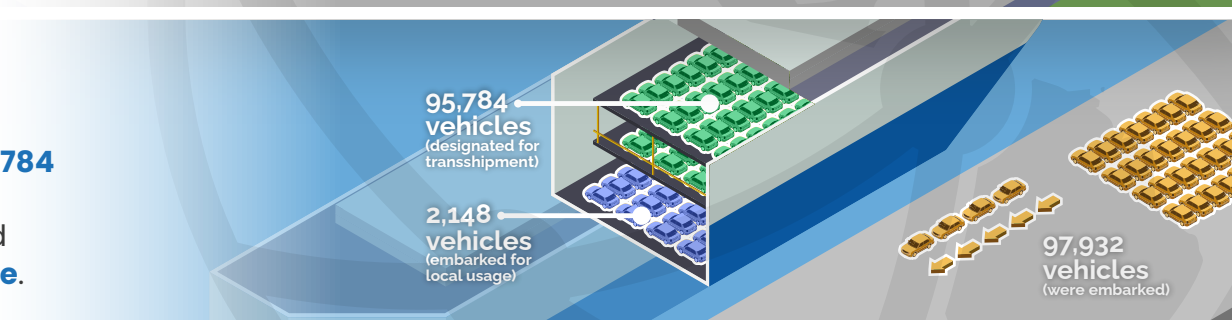
In **2023**, ports registered a total of **242,011 vehicles mobilized**, of which **144,079 were disembarked**.



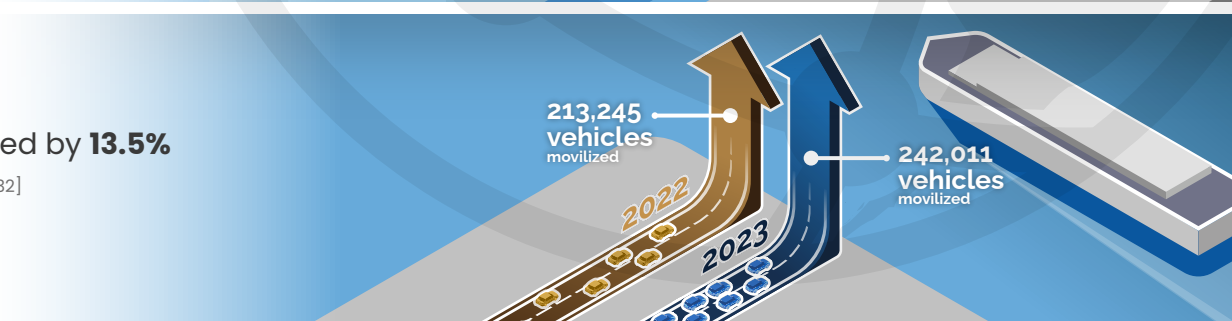
Among the disembarked vehicles, **94,274 were intended for transshipment**, and **49,805 remained in Panama**.



Additionally, **97,932 vehicles were embarked**, with **95,784 designated for transshipment** and **2,148 for local usage**.

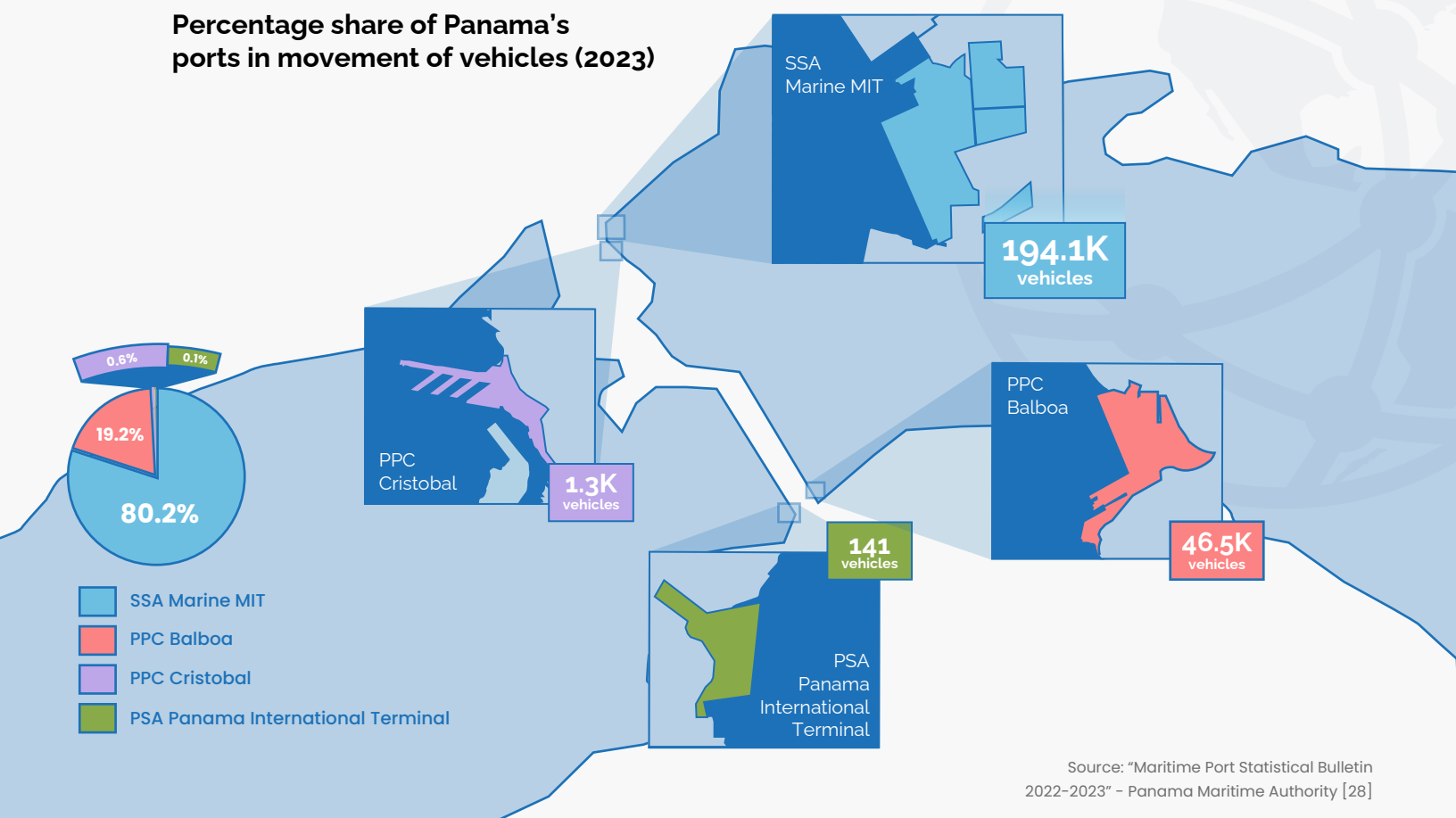


This activity increased by **13.5%** compared to 2022.<sup>[32]</sup>





### Percentage share of Panama's ports in movement of vehicles (2023)



**SSA Marine MIT** was the port with the most movements in 2023, registering 80.2% of the vehicle units mobilized. This included 101,756 for disembarkation and 92,372 for embarkation. It was followed by **Balboa** with 19.2%, **Cristobal** with 0.6% and **PSA Panama** with 0.1% of the vehicle movements.<sup>[30]</sup> As of June 2024, 30,209 shipments and 47,158 disembarkations were registered, for a total of 77,367 vehicles mobilized.<sup>[31]</sup>

In 2023, around 813 Ro-Ro vessels transited through the Panama Canal, approximately 9% more than in 2022. Of the total, 747 went through the Panamax locks, and 66 through the Neopanamax locks. The transit of vehicle carriers / Ro-Ro represented around 7% of the total transits of the Canal in 2023.<sup>[33]</sup>

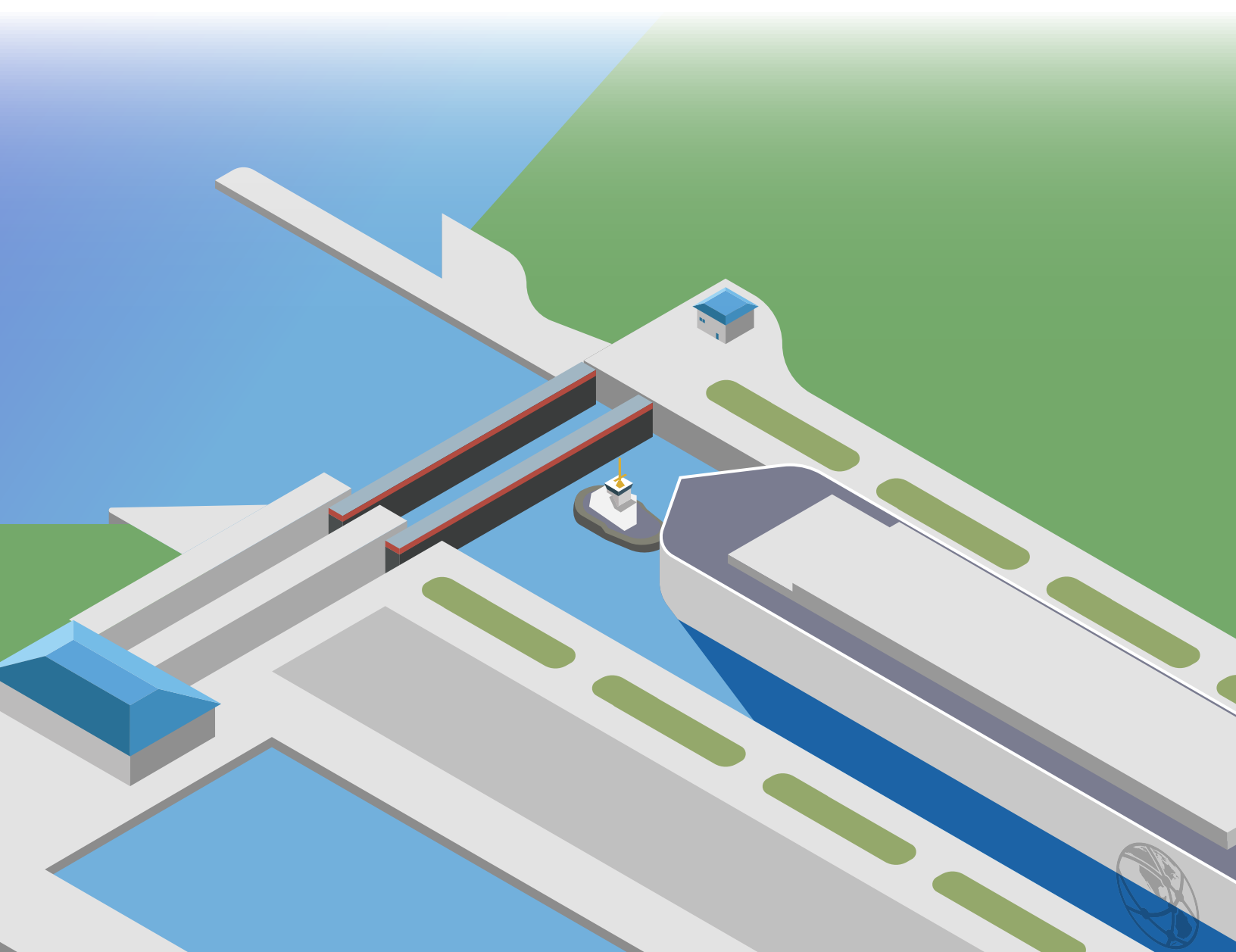
## Exploring why Panama

Panama has established itself as a key logistical hub in the region, facilitating the distribution of auto parts and vehicles. This positioning is bolstered by its unique geographical location and world-class logistics infrastructure. The country offers significant benefits, such as reduced transit times and lower operating costs, by allowing inventory to be stored close to the market in free zones. Additionally, Panama's skilled labor force ensures quicker delivery times, while a robust multimodal transportation network guarantees responsiveness to demand regardless of interruptions. <sup>[37]</sup>

Moreover, Panama provides an ideal environment for the distribution of auto parts and vehicles, thanks to its strategic initiatives and infrastructure. The Panama Canal, ports equipped to receive Ro-Ro ships, multiple airports, and special economic zones work in unison to facilitate efficient distribution, enhancing the supply chain and reducing transit times. In 2023, approximately 813 Ro-Ro vessels transited through the Panama Canal, representing a 9% increase from 2022. Of these, 747 went through the Panamax locks and 66 through the Neopanamax locks, with vehicle carriers accounting for around 7% of total transits. This underscores Panama's role as a critical link for the automotive industry, providing an efficient route for the movement of vehicles and auto parts. Additionally, the country's five specialized container ports—three on the Atlantic side (SSA Marine MIT, Colón Container Terminal, and Cristóbal) and two on the Pacific side (Balboa and PSA Panama International Terminal)—handled 8.32 million TEUs and received 374 Ro-Ro vessels in 2023, further reinforcing its logistical capabilities. <sup>[30][31][33]</sup>

The Center for Innovation and Logistics Research, Georgia Tech Panama, offers invaluable resources to help businesses capitalize on Panama's strategic advantages. Through its website and key initiatives—such as the Why Panama? project and the Panama Logistics Portal—companies can access essential data and decision-making tools. The Why Panama? project provides in-depth analysis of the

benefits of establishing a distribution center in the country, including quantitative insights on costs, investments, and service efficiencies.<sup>[35]</sup> Meanwhile, the Panama Logistics Portal delivers real-time information and optimization tools to strengthen logistical operations.<sup>[36]</sup> If you are looking to expand your business and leverage Panama's world-class logistics infrastructure, visit these platforms to explore the full range of opportunities available.



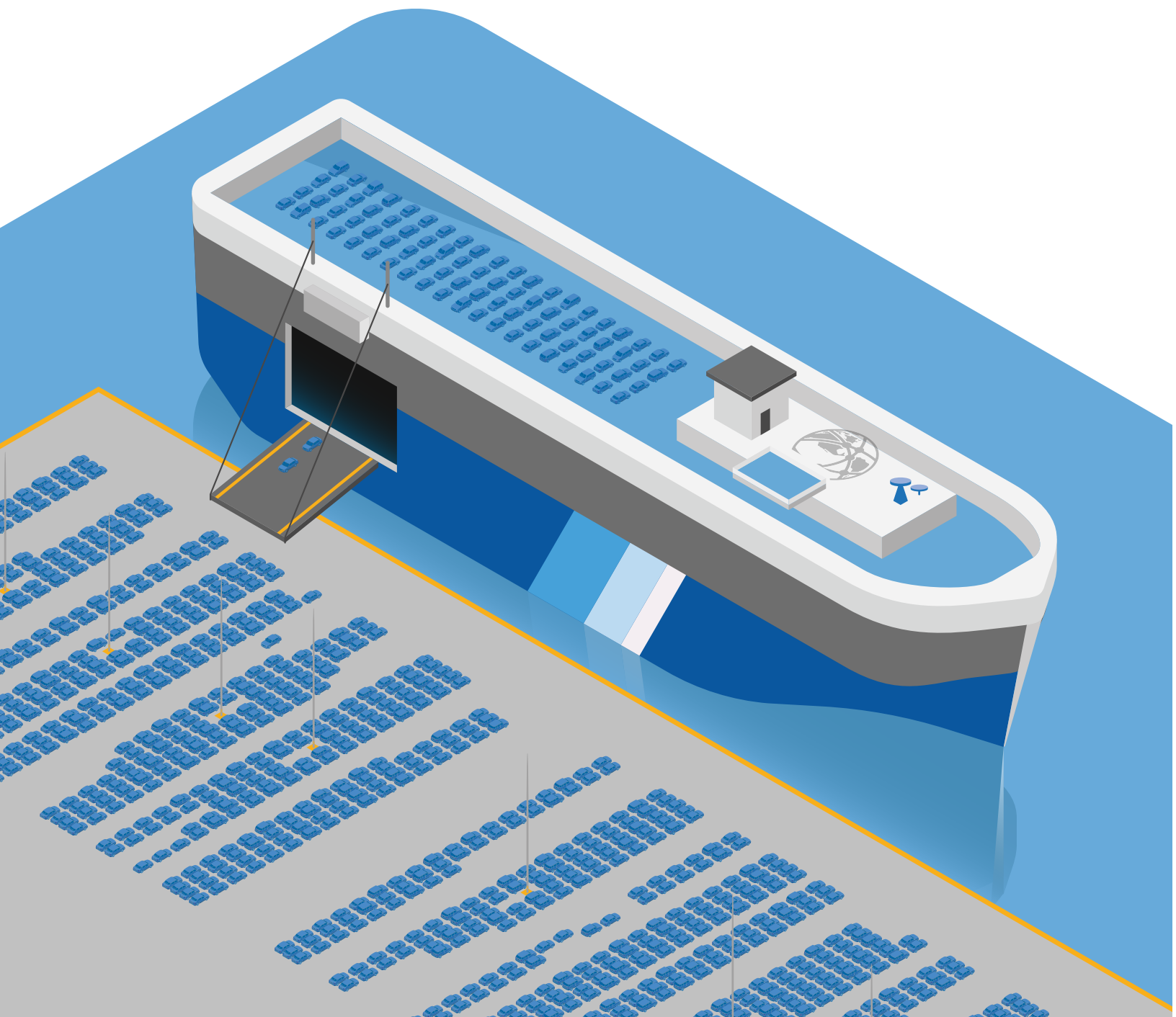
# Notes

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# About the Why Panama Program



In the current dynamic global landscape, it is clear that having access to high-quality insights is crucial when determining the optimal location for regional distribution in order to take advantage on the present structure of global value chains.

Georgia Tech Panama Logistics Innovation & Research Center recognizes the importance of key insights in the decision-making process, and works closely with companies seeking to assess their supply chains and how Panama can become a key part of their global logistics network.

The "Why Panama" program utilizes quantitative data and analytics to assess key variables and compare the costs, investments, and service benefits of setting up a distribution center in Panama. By conducting a thorough analysis, the program aims to provide businesses with valuable insights into the advantages of establishing a hub in Panama.

To know more you can contact Jeancarlos Chen at [jeancarlos.chen@gatech.pa](mailto:jeancarlos.chen@gatech.pa) or Jorge Barnett at [jorge.barnett@gatech.pa](mailto:jorge.barnett@gatech.pa)

Reach us at  
[www.gatech.pa](http://www.gatech.pa)

## WRITTEN BY

Angela Agudelo

## EDITED BY

Jeancarlos Chen

Kristel Suárez

Sahian Rosales

Jorge Barnett

## ILLUSTRATED BY

Paolo Guelfi

## About Us

The Georgia Tech Panama Logistics Innovation and Research Center is located in Panama City, Panama. It was launched in 2010 by an agreement between the Georgia Institute of Technology and the Government of Panama through the National Secretariat of Science, Technology and Innovation (SENACYT).



**Georgia Tech Panama**  
Logistics Innovation & Research Center



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# Georgia Tech **Panama**

Logistics Innovation & Research Center

An innovation center of  **SENACYT**  
Secretaría Nacional de Ciencia, Tecnología e Innovación

## **CONTACT US**

(+507) 395-3030

[georgiatechpanama@gatech.pa](mailto:georgiatechpanama@gatech.pa)



**gatechpanama**