Navios South American Logistics Inc.

# The impact of fluvial shipping on the Paraguayan economy

# Content

# Context and objectives

Commissioned by Navios South America Logistics Inc., this report aims to take an impartial view of the shipping sector and aims to fulfill three primary objectives:

1. Develop an integrated perspective of the Hidrovia shipping ecosystem and Paraguay's role in it
2. Assess the impact of shipping and related industries on the Paraguayan economy
3. Estimate the full potential of shipping related industries and services and identify focus areas to capture it

The research leveraged primary and secondary sources, including interviews with more than 15 stakeholders from the private and public sectors, value chain operators, associations, and experts, among others. Impact on GDP output and jobs was measured based on the McKinsey Institute's Input and Output methodology, using data gathered through a bottom-up methodology and multipliers garnered for Paraguay by the Asian Development Bank. The study calculates impact as direct and indirect:

- Direct impact: monetary and job impact stemming directly from the shipping industry (for example, $1 spent on shipping operations is equal to $1 impact)
- Indirect impact: monetary and job impact that can be attributed to suppliers of the shipping cluster (for example, local equipment suppliers for shipbuilders) and induced impact (for example, the families of shipyard workers)

# Abstract

The Hidrovía Paraguay-Paraná (HPP) is a key transportation route for Paraguay, transporting 70 percent of the country's exports and 50 percent of its imports. In 2023, 26 million tons of cargo were transported through the Brazil, Bolivia, and Paraguay sections. Soy and soy derivatives and iron ore represented the bulk of exported cargo, and fuel and fertilizers represented most of imported cargo. Beyond the cargo transported, the waterway has relevance for Paraguay's shipping sector as approximately 90 percent of vessels on the HPP are registered under the Paraguayan flag. Paraguay is home to an extensive shipping cluster generating significant impact for the economy and society with approximately 2,200 barges and 220 pushboats in the active fleet, as well as more than 50 ports, and 13 shipbuilders—and the country generates approximately 12 million tons in cargo per year.

Activity on the HPP has a current economic impact of $1.1 billion in gross output, comparable to approximately 2 percent of Paraguay's GDP.[1] Sixty-two percent of the impact is direct, and the rest is indirect. The main drivers are bunkering and port costs, vessel operating costs, new vessels, and seafarer wages. The industry also generates 26,000 jobs. There are 13,000 workers in the industry now, and another 13,000 jobs are generated indirectly. In addition to the economic impact of the shipping industry, river transport supports 70 percent of Paraguay's GDP and is also 12 times more carbon efficient than road transport.

By 2030, considering cargo growth and an increase in Paraguay's share of business in the HPP, this impact could grow to $3 billion, and 56,000 jobs. To reach this potential, there are best practices that Paraguay could follow. These include maintaining a stable regulatory framework, developing a national navigability masterplan, fostering maritime education, promoting the development and application of maritime technology, fleet renewal, and a stronger collaboration between HPP member countries.

[1] The economic impact in terms of GDP (value added) is $0.7 billion, comparable to 2 percent of Paraguay's $42.6 billion GDP.

# A. Hidrovía Paraguay-Paraná is a crucial waterway for South America's internal and external trade

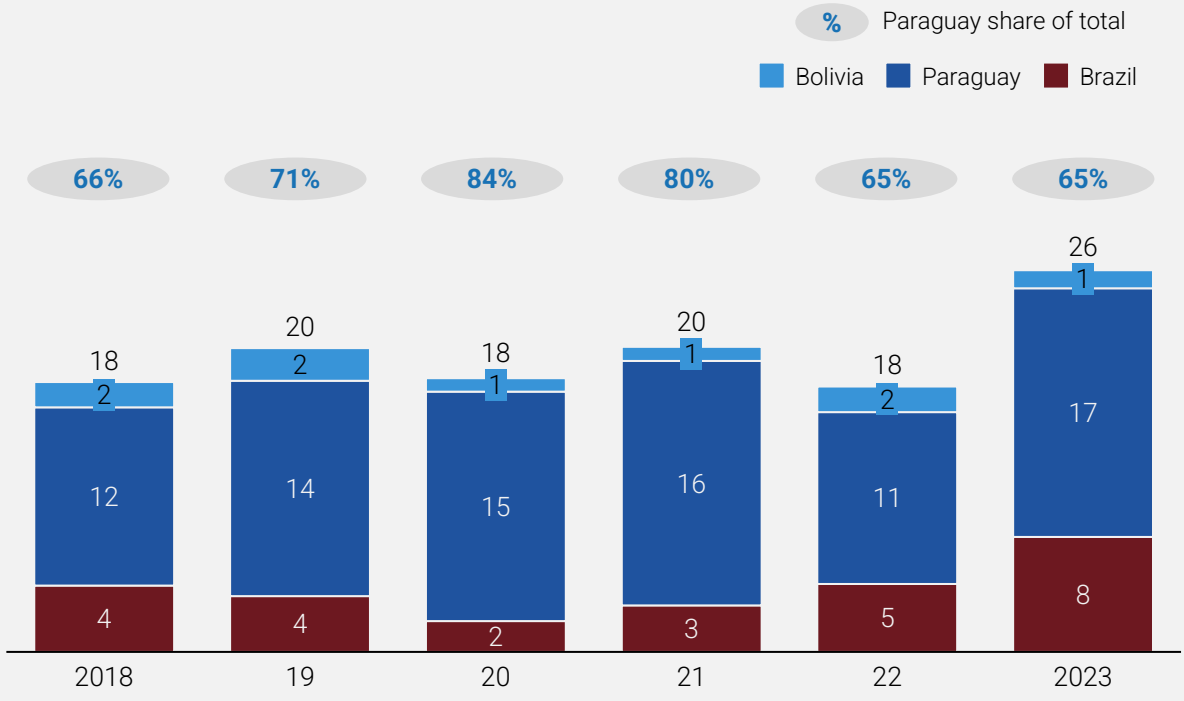
The Hidrovía Paraguay-Paraná (HPP) runs 3,442 km long, from southern Brazil to Uruguay and Argentina. It is one of the main fluvial transportation routes in the world. In terms of cargo transported, the HPP is one of three waterways in the world transporting approximately 30 million tons of cargo per year, only behind the Yangtze and Mississippi rivers, with 3,500 million tons and 500 million tons per year, respectively. Its trade is over three times larger than the major European Rhine-Main-Danube system.

More importantly, the HPP is not only a central transportation route for South America but also plays a significant role for Paraguay. HPP carries 70 percent of Paraguayan exports and 50 percent of imports and it is Paraguay's only viable way to access ocean shipping.

1. **Approximately 26 million tons of cargo were transported in 2023 through the BO/BR/PY sections; soy, soy derivatives, and iron ore represented the bulk of cargo**

The Paraguayan economy benefits from the trade between Brazil, Bolivia, Paraguay, and the rest of the world. In 2023, approximately 26 million tons of cargo passed through the Brazil, Bolivia and Paraguay sections (Figure 1). Around 65 percent of this cargo is accounted for by Paraguay since Brazil and Bolivia have access to other export routes, such as waterways and rails to Atlantic ports (Brazil) and roads to Pacific ports (Bolivia).

Figure 1: Cargo transported by country (exports and imports), million tons[1,2]




[1] Does not include Brazilian imports. Exports from Paraguay to Bolivia and from Bolivia to Paraguay considered only for each respective country to avoid double counting

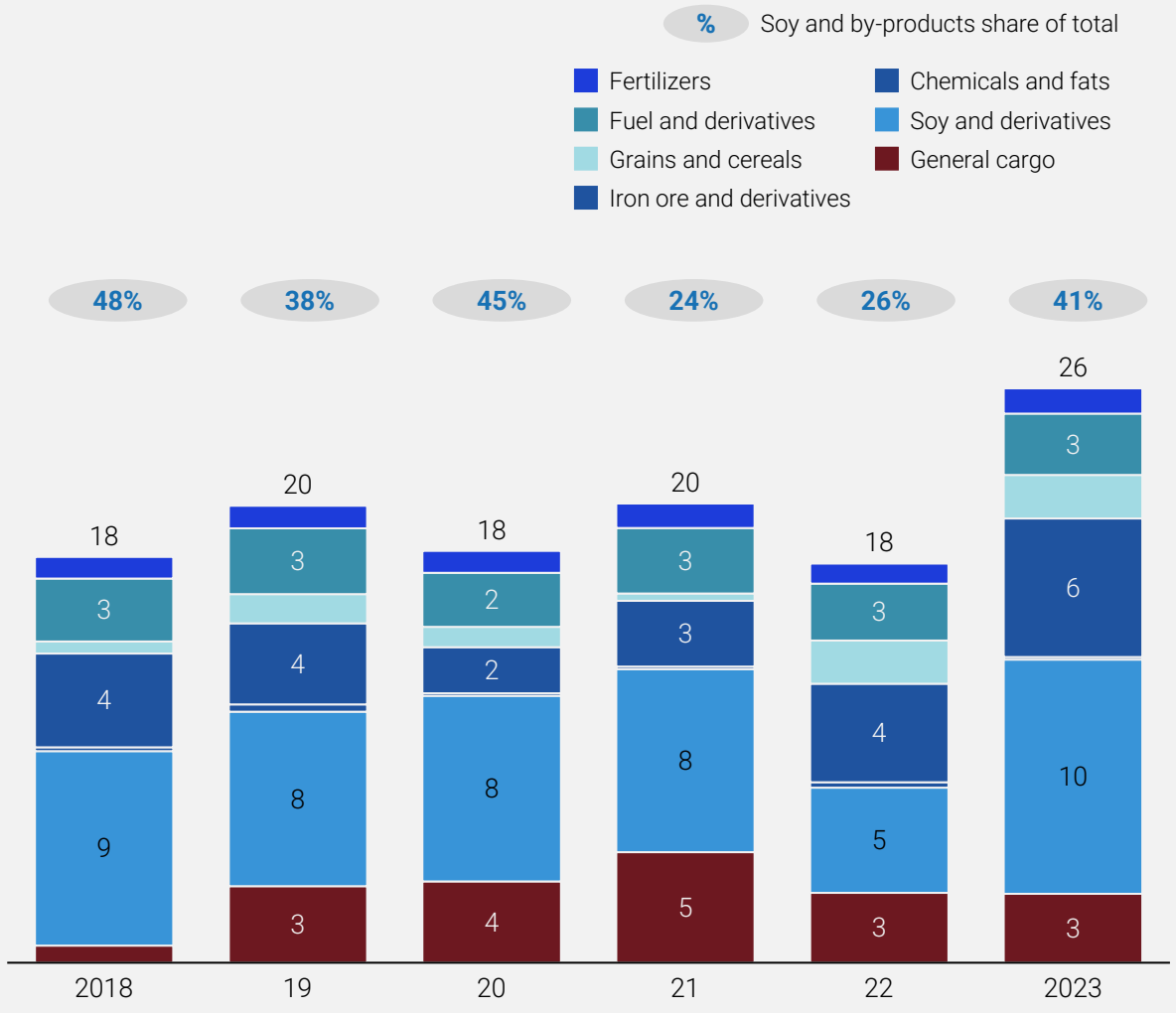
[2] Penta-transactions, CPTCP, Bolsa de Rosario, IHS Markit, Bolivian Ministry of commerce (January–October).

Soy and soy derivatives and iron ore represented the bulk of exported cargo, while fuel and fertilizers represented most of imported cargo. The 2021–2022 droughts decreased trade volumes temporarily, although a rebound is expected for 2023 and 2024 (Figure 2).

### 2. Soy exports mainly directed towards Argentina for processing

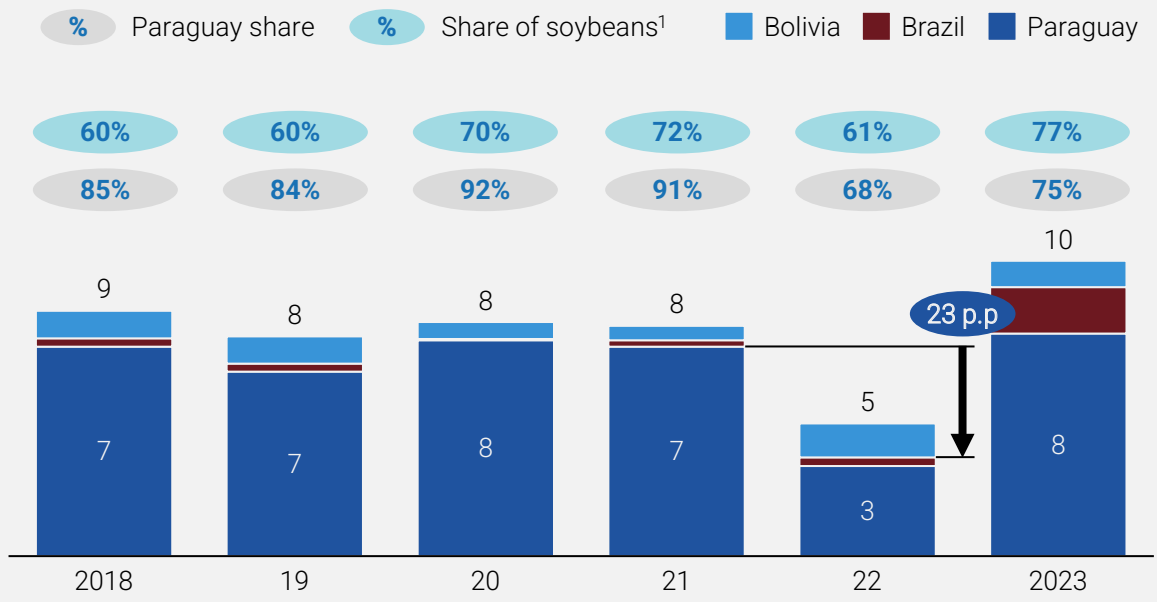
Almost all soybean Paraguayan exports go to Argentina to be processed. During 2023, Argentine soybean production at its soybean process plants was not sufficient to cover the country's demand due to severe droughts. As a result, Argentina imported soybeans from Brazil, which was the main reason soybean exports from Brazil increased between 2022 and 2023 (Figures 3 and 4). Experts anticipate that, given the current transportation cost advantage of the HPP, Brazilian soybean exports will return to their previous levels as Argentina increases production.

Figure 2: Cargo transported by type, million tons[1]




[1] Penta-transactions, CPTCP, Bolsa de Rosario, IHS Markit, Bolivian Ministry of commerce (January–October).

Figure 3: Soy and derivatives exports through HPP by origin country, million tons[1]

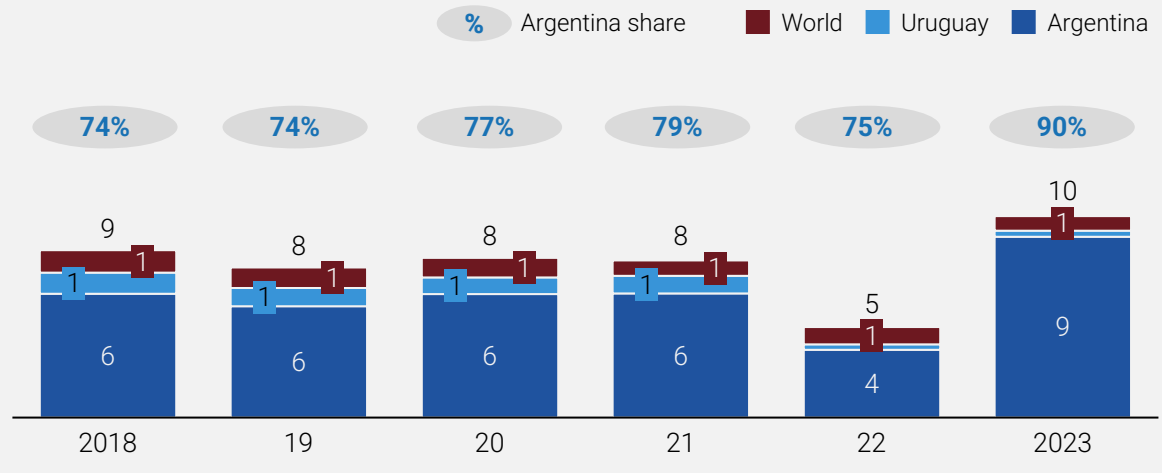



[1] Penta-transactions, CPTCP, Bolsa de Rosario, IHS Markit, Bolivian Ministry of commerce (January–October).

### 3. Iron ore exports through the HPP have been growing due to fluvial transport capacity and competitiveness improvements from Corumbá mines

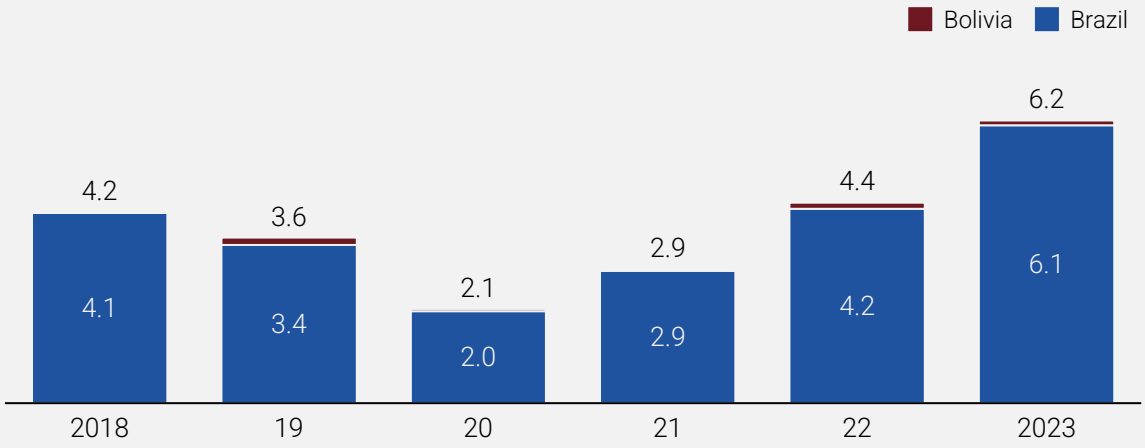
Iron ore exports through the HPP have been growing due to fluvial transport capacity (Figure 5). In 2022, J&F purchased iron ore mines from Vale, in Corumbá, Mato Grosso do Sul. Since then, J&F has progressively boosted iron ore production capacity resulting in increased volume exports through the HPP.

Figure 4: Soy and soy derivatives exports by destination country, million tons[1]




[1] Penta-transactions, CPTCP, Bolsa de Rosario, IHS Markit, Bolivian Ministry of Commerce (January–October).

Figure 5: Iron ore and derivatives exports through HPP by origin country, million tons[1]




[1] Penta-transactions, CPTCP, Bolsa de Rosario, IHS Markit, Bolivian Ministry of Commerce (January–October).

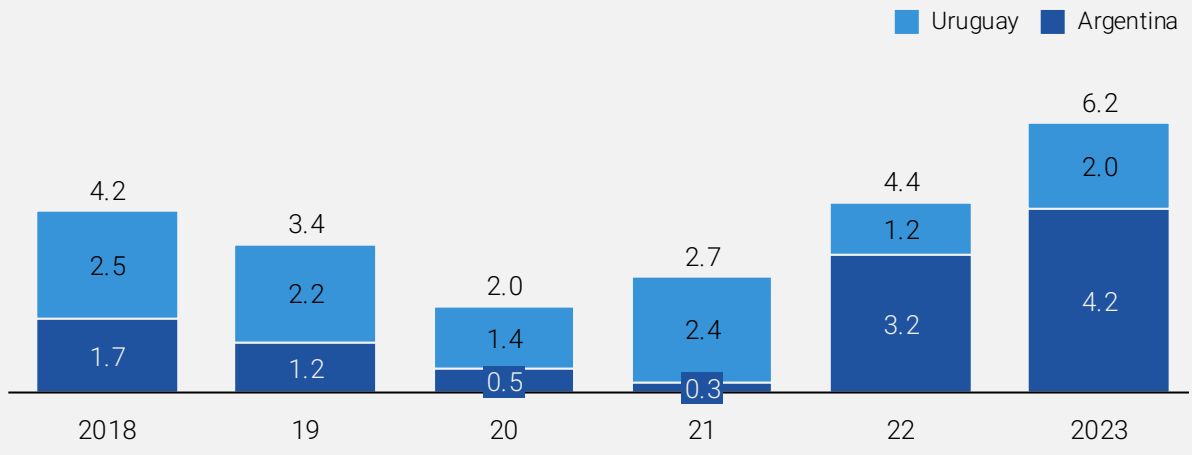
Nueva Palmira, in Uruguay, transships most of this iron ore, mainly to Europe (Figure 6). Argentina imports the rest for steel processing. The expectation is that J&F will increase its capacity to over 10 million tons per year by 2025.

**4. HPP accounted for approximately 17 million tons of Paraguay's imports and exports in 2023, with soy and by-products representing approximately 67 percent of total exports**

For Paraguay specifically, the HPP transported 17 million tons of Paraguay's imports and exports in 2023. Soy and soy derivatives accounted for 67 percent of the 12 million tons of exports, which were destined to be processed in Argentina (Figure 7). Fuel represented 52 percent of the 5 million tons of imports. General cargo represented 26 percent of the imported volume, but due to its higher price, it represented 48 percent of the imported value in 2023[2].

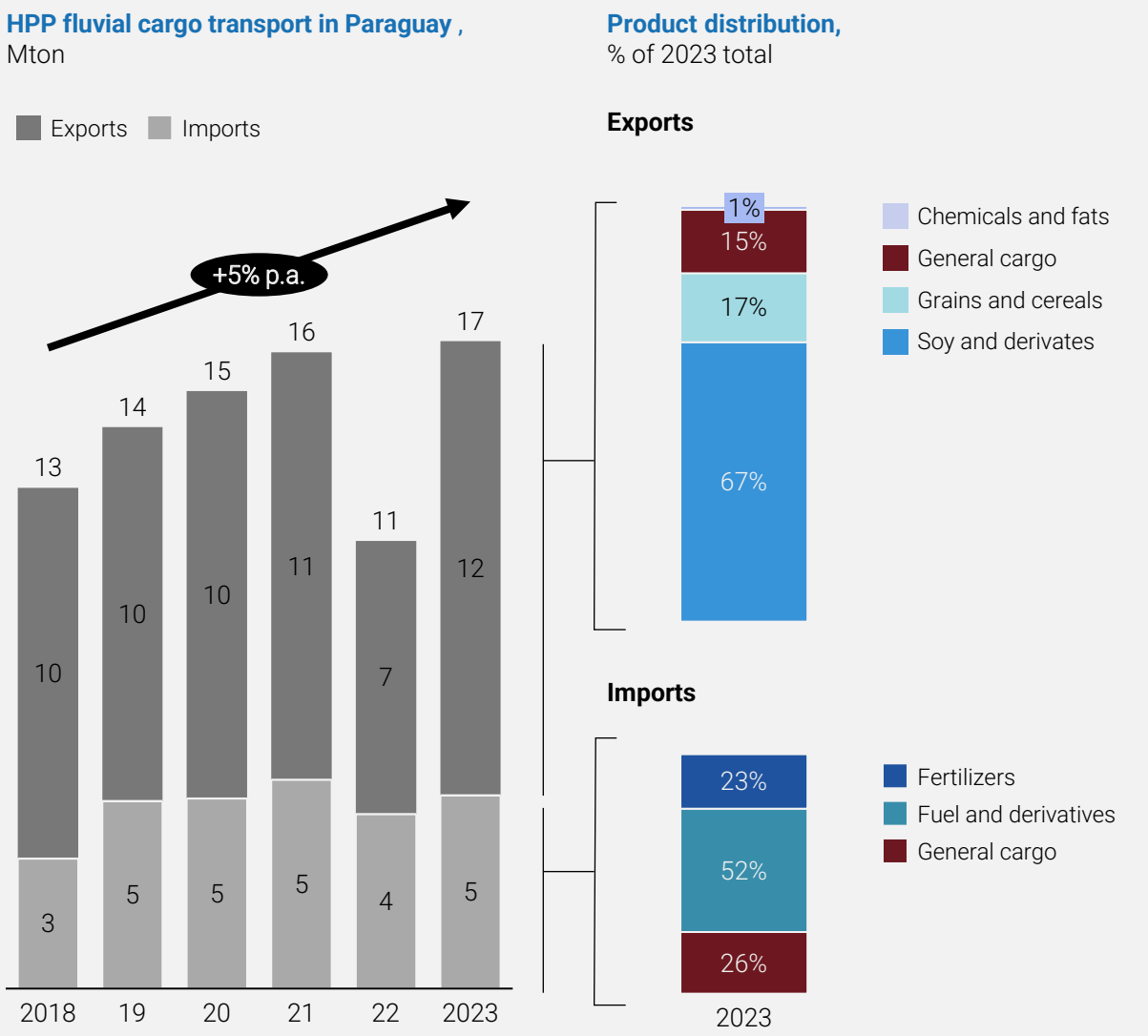
[2] Value measured in CIF (cost, insurance, and freight). The general cargo imported by Paraguay consists of cars and auto parts, agro-chemicals, metals, and beverages, among others.

Figure 6: Iron ore and other mineral exports through HPP by destination country, million tons[1]




[1] Penta-transactions, CPTCP, Bolsa de Rosario, IHS Markit, Bolivian Ministry of Commerce (January–October).

Figure 7: Paraguay imports and exports, million tons



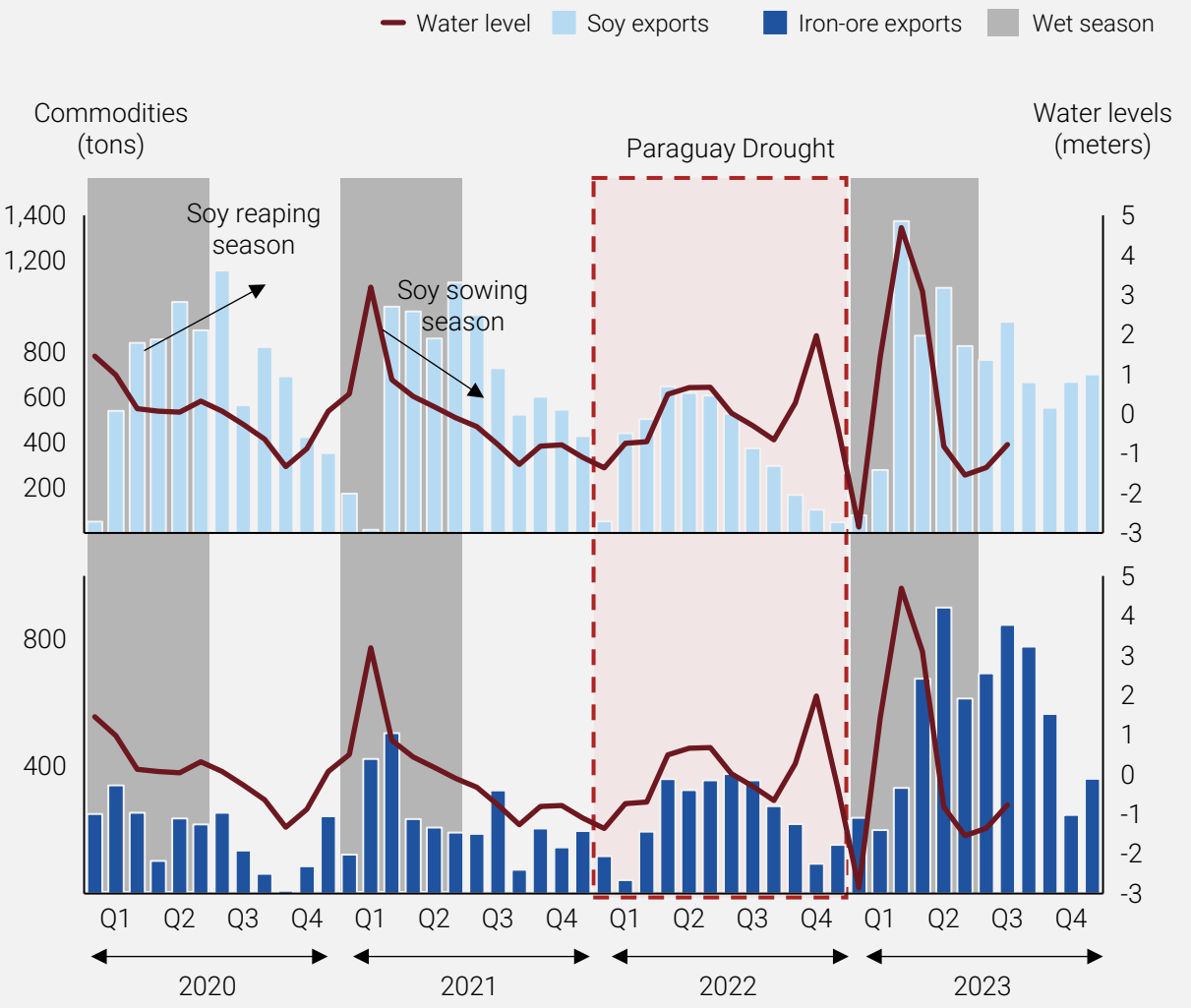

Source: Paraguay numbers through Penta Transactions app with data from customs and public entities, CPTCP, Bolsa de Rosario, IHS Markit for Iron ore and soy exports from Brazil, Bolivia numbers from Ministry of commerce

### 5. More than 90 percent of vessels are registered under the Paraguayan flag; one of the largest fleets globally in the segment

Paraguay is an important player on the HPP. Paraguay has the fourth-largest barge fleet globally.[3] Around 90 percent of vessels operating in the HPP are under the Paraguayan flag, which requires that all the crew is Paraguayan. Paraguay also owns 75 percent of the ports that exist between Brazil, Bolivia and Paraguay. The formation of this shipping ecosystem in Paraguay has been driven by its geographic location and regulatory framework. The HPP is Paraguay's only access to the ocean, and its regulatory stability and competitive taxation scheme have attracted players from neighboring countries.

[3] The largest fleet belongs to the United States, followed by China and the Netherlands.

Figure 8: Water levels vs. soy and iron ore transported, million tons




Source: Sistema de Información del Agua de Paraguay, Penta-transactions.

### 6. Seasonality in water levels affects the volume transported monthly

The main challenge affecting the HPP currently is its level of navigability (Figure 8). The navigability level is affected by water levels and the presence of critical passages. Dry season occurs between mid-November and mid-January when trade decreases significantly in volume. The decrease in trade volume occurs because as the river is shallow, operators are unable to load barges to full capacity, which reduces profitability. This reduction was exacerbated during the 2021–2022 drought in Paraguay. While 2023 was a fairly normal year, water levels continue to be a limiting factor in fluvial trading during 2024.

The HPP is a crucial lifeline for Paraguay's economy given its role in the export of commodities (soybeans) and import of fuels and fertilizers. Additionally, it provides a competitive exit route for products originating from Brazil's southwestern regions and Bolivia's east, primarily mineral exports. Paraguay is the largest beneficiary from increased traffic through the HPP, although challenges remain, such as seasonality in water levels and sporadic dredging.

# B. The shipping ecosystem contributes significantly to the Paraguayan economy and quality of life

Paraguay is home to an extensive shipping cluster generating significant impact for the economy and society with approximately 2,200 barges and 220 pushboats in the active fleet, as well as more than 50 ports, and 13 shipbuilders—and the country generates approximately 12 million tons in cargo per year. The shipping ecosystem creates direct and indirect economic impact, supports production in other sectors, and improves living standards.

### 1. Shipping on the HPP creates direct and indirect economic impact, contributing to 2 percent of Paraguayan GDP

The shipping ecosystem is essential to the Paraguayan economy, contributing approximately $1.1 billion in gross output, $0.7 billion in GDP (2 percent of GDP) and 26,000 jobs (representing 6 percent of private, formal employment)[4]. Sixty-two percent of this impact is direct, and the rest is indirect (Figure 9).

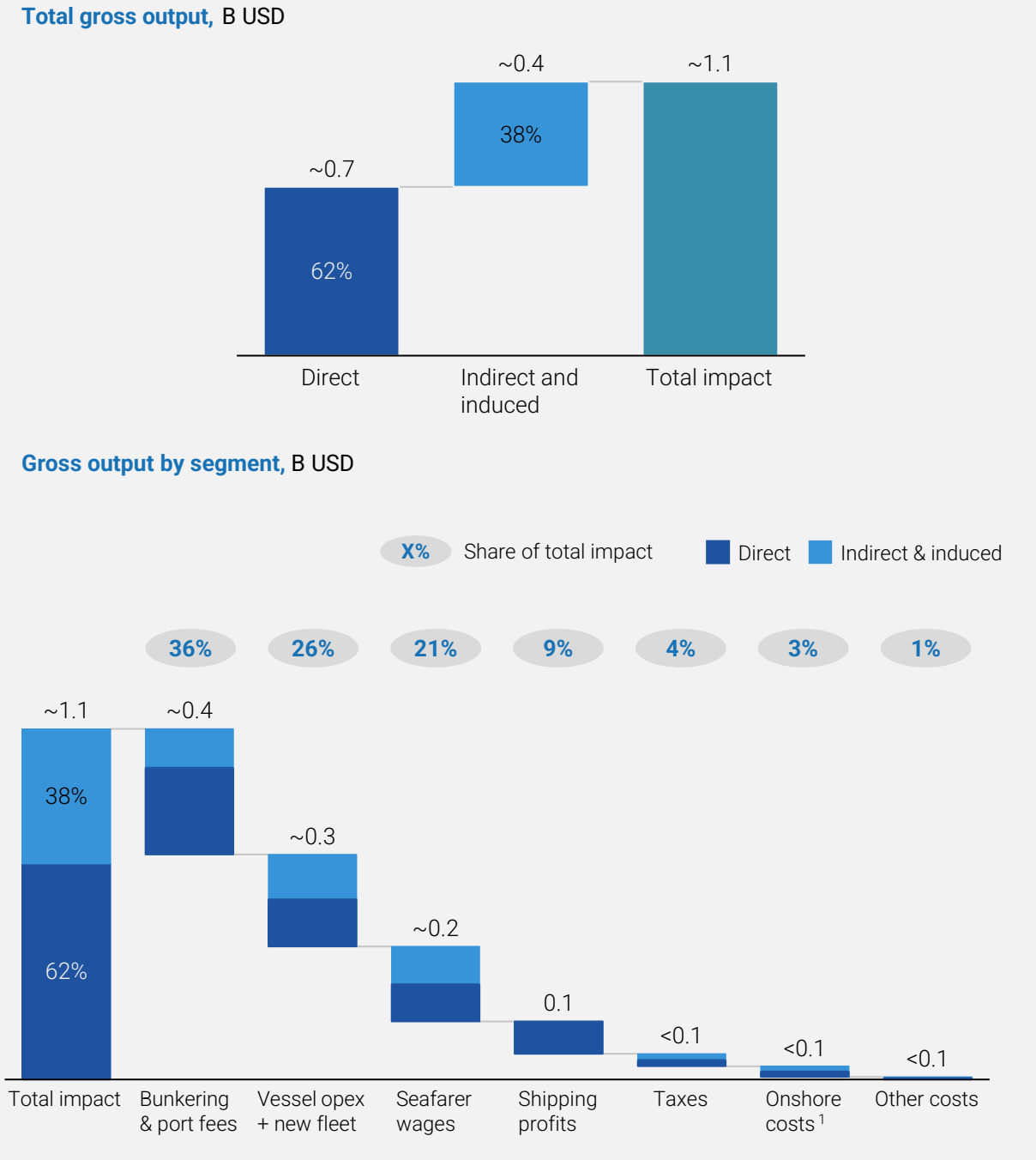
The shipping industry's direct contribution is $0.7 billion in gross output, which is calculated as the total industry spend in Paraguay. The calculation takes into account all expenditures required to operate vessels (that is, seafarer and onshore wages, bunkering, port fees, vessel maintenance costs, consumables, lubricants, rent and utilities, and services such as legal / financial fees, and flag costs), the investment required in new vessels (barges and pushboats), operators' taxes, and operators' net profits (Figure 10). The main drivers of direct impact are bunkering, seafarer wages, profits, and port fees (Figure 9).

The shipping industry's indirect contribution is $0.4 billion, calculated as the indirect expenditures that occur in the economy by the shipping industry's suppliers (that is, cargo and fuel providers), and both shipping and suppliers' employees' spend. The same categories are considered as direct impact, and the main drivers of indirect impact are seafarer wages, investments in new fleet, and port fees (Figure 9).

[4] To calculate the direct and indirect impact in terms of output, GDP, and employment creation, input/output tables for Paraguay were used, following McKinsey Global Institute's methodology.

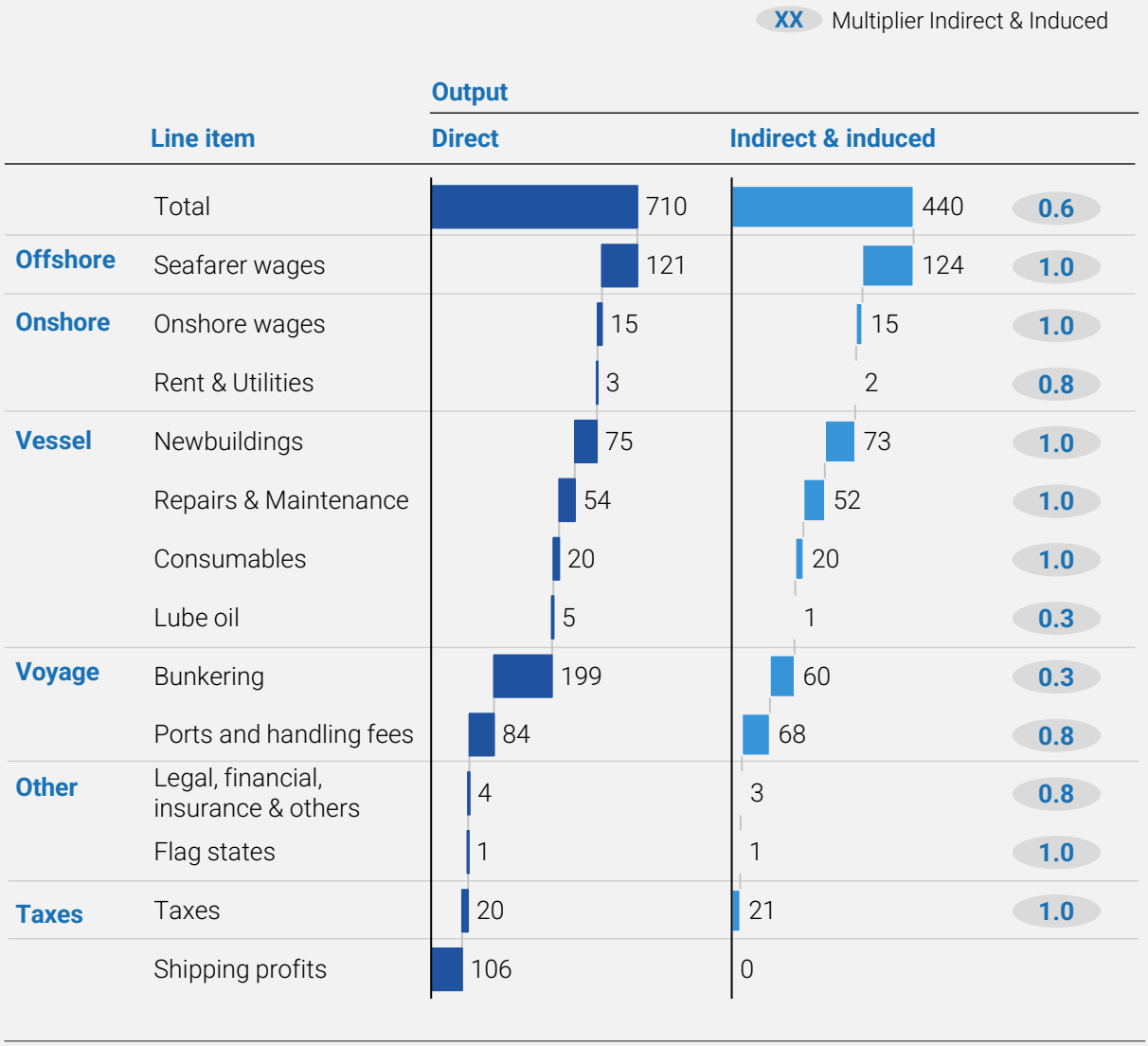
The shipping ecosystem supports 26,000 jobs directly and indirectly. Onshore employees receive on average three times the country's average, while seafarer wages go up to eight times. In the shipping employment ecosystem 13,000 jobs are direct, of which 3,000 are seafarers, 4,200 port and terminal workers, 2,000 shipyard workers and technical vendors, 1,000 work in ship management, and 1,000 in vessel supplies, while the remainder works in services. The remaining 13,000 are indirect jobs generated outside of the core shipping cluster.

Figure 9: Gross output direct and indirect impact, million tons




[1] Includes insurance, financial services
Source: MGI, publicly available data, expert interviews

Figure 10: Impact generated by line item in 2023, million tons




Source: Publicly available data, CAFyM, interviews, MGI

### 2. The HPP is a key growth enabler for Paraguay, supporting production in various sectors

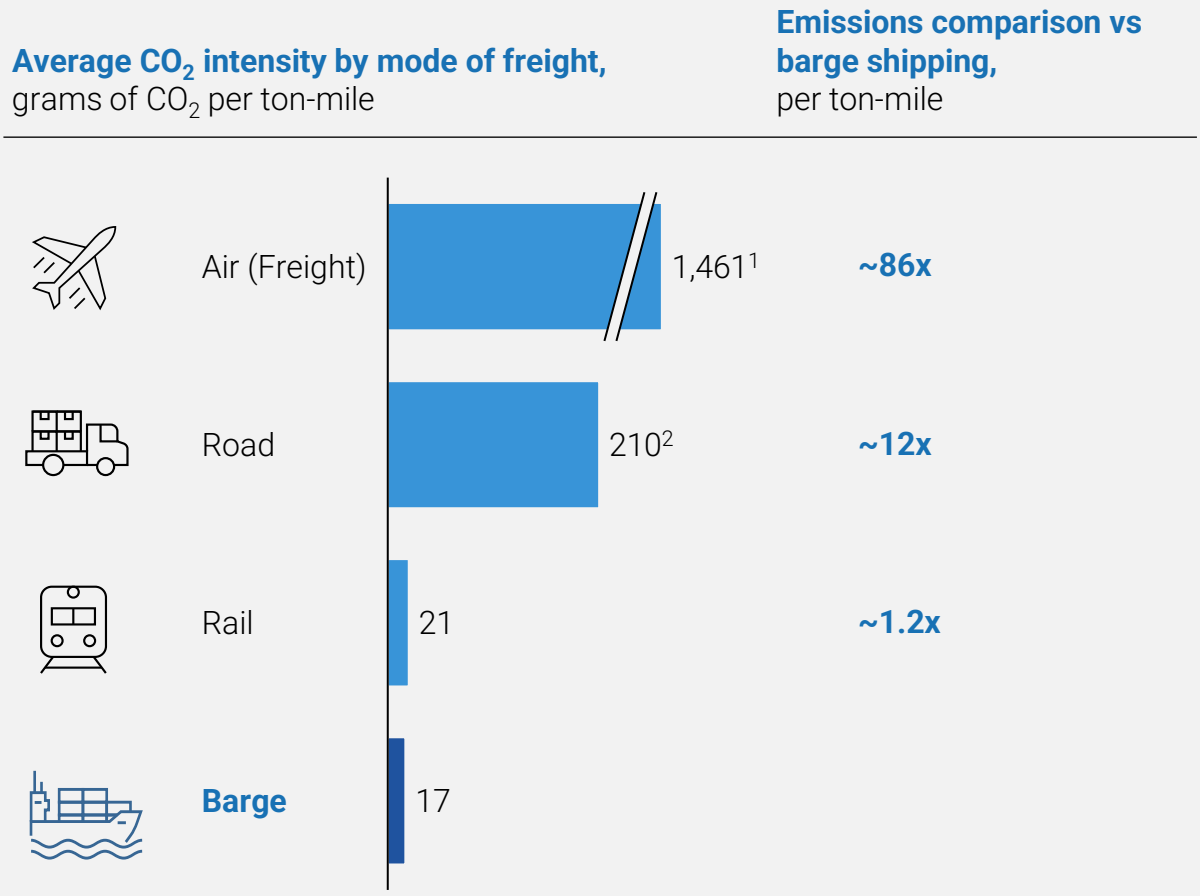
The HPP supports production in other sectors of the Paraguayan economy. The HPP transports 70 percent of exports and 50 percent of imports, including 70 percent of agricultural exports, and almost all fuel imports. Transportation on the HPP has reduced logistics cost, compared to the previous alternative which included rail transportation through Brazil to the Atlantic Ocean. This has enabled increased agricultural and mining production and lowered the cost of fuel, eventually lowering costs of living in Paraguay. The HPP also enables economic activity that contributes to the generation of 70 percent of Paraguay's GDP.[5]

[5] The HPP is critical for trade and financial activities (17 percent of GDP), transport and communications (8 percent), agriculture (6 percent), animal farming (2 percent) and mining (>1 percent). It also has an indirect influence on industry (20 percent), services (10 percent), and construction (7 percent).

### 3. Shipping on the HPP improves Paraguayan's standard of living, also reducing transport pollution

Finally, shipping on the HPP also supports quality of life in two ways. First, higher wages (up to eight times the average Paraguayan salary) allow for increased spend and therefore higher quality of living. Second, fluvial convoy transportation is one of the most environmentally friendly transportation options. Fluvial shipping is up to 85.9 times more carbon efficient than air transportation, about 12.0 times more carbon efficient than road transport, and about 1.2 times more carbon efficient than rail transportation on a ton-mile basis (Figure 11).

Figure 11: Comparison of carbon emissions by transportation method, million tons




[1] Long-haul flight gram CO2 per ton-mile considered
[2] Average across trucking products that include expedited, packaging, TL, LTL etc
Source: EPA – Smartway 2023; Maritime Transportation Research and Education Center

# C. Paraguay's shipping cluster has great potential, which could create further growth opportunities

Based on forecasts, Paraguay's shipping cluster has the potential to multiply its current economic impact by 2.6 times, reaching $3 billion in gross output by 2030, and generating approximately 30,000 additional jobs. Increased cargo transported on the HPP and an increased share of Paraguayan activity via the HPP are the main drivers behind this increase.

1. **Paraguay could capitalize on the expected increase in cargo to grow its shipping cluster and related economic impact**

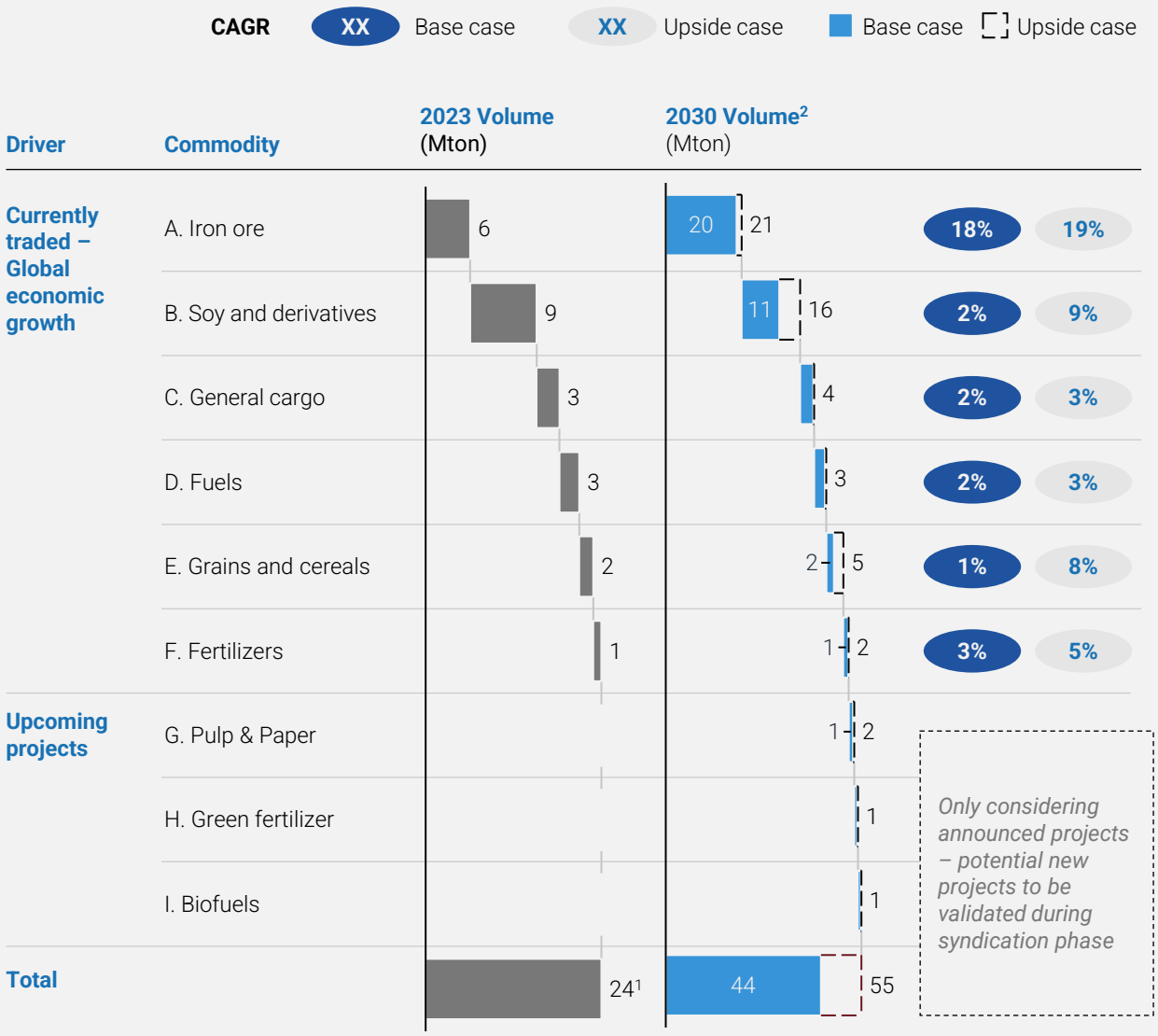
According to projections, cargo transported on the HPP will increase from 24 million to up to 55 million tons by 2030 (Figure 12). Through this increase, the shipping cluster in Paraguay could generate approximately $1.4 billion of additional gross output, and 23,000 additional jobs.

Two main factors lead to this increase in cargo. An increase in demand for the currently traded commodities,[6] and the development of new projects along the HPP.[7] An improvement in the HPP's competitiveness could attract a portion of soy and grain cargoes that currently travel from Mato Grosso do Sul via train towards ports on the Atlantic Ocean.

Most of the projected cargo increase is driven by additional capacity of iron ore mines in Mato Grosso do Sul, particularly from the mines that J&F purchased from Vale. The second driver would be soy and other grains. Finally, there is another significant factor that supports future transport growth. Be8, Atome, Ammonia Energy Association, and Paracel are building processing plants around the HPP's catchment area that are expected to provide up to 4 million tons of cargo per year in biofuel, as well as green fertilizer, and pulp and paper products. These additional cargoes will require an increase in transportation capacity on the river.

[6] Currently traded commodities include iron ore, soy and derivatives, other grains and cereals, general cargo, and fuel and fertilizers.
[7] New projects include pulp and paper mills, and green fertilizer and biofuel facilities.

Figure 12: Commodities transported on the HPP, 2023 and 2030, million tons




[1] Numbers for Brazil have been averaged 2018-2022 given 2023 as outlier year due to droughts (real numbers for 2023 equal 26Mton instead of 24Mton)

[2] Ranges correspond to base case and upside case determined according to forecasted increases in production and exports through the HPP, as well as potential increase in HPP's competitiveness for BR agricultural exports

Source: Interviews, publicly available data

### 2. Paraguay could also capture a larger share of the HPP activity, mainly from shipbuilding and maintenance services

Beyond additional quantities of cargo transported on the HPP, the second lever for delivering greater potential is Paraguay's ability to capture a larger share of the business generated by higher transport levels. Through this increase in share of transport levels, it is estimated that the shipping cluster in Paraguay could generate approximately 0.4 billion of additional gross output and 8,000 additional jobs.

The main determinants of share of business on the HPP are (1) bunkering and port fees, (2) vessel operating costs and new fleet, and (3) seafarer wages. This analysis focuses on shipbuilding and maintenance, which are part

of vessel operating costs, and new fleet, and seafarer wages.[8]

In terms of shipbuilding, it is expected that Paraguay will be able to increase its share of shipbuilding from 60 percent to 70 percent.[9] The main competition is expected to come from Brazil, in terms of cost, quality, and delivery time. Brazil is estimated to be the main consumer of new barges, as future cargo increases will likely come mainly from Mato Grosso do Sul in Brazil. J&F is expected to purchase 400 new barges by 2030.[10] Although the Brazilian government has provided a strong financial incentive for J&F to build in Brazil, capacity and experience limitations in the Brazilian shipbuilding industry may leave room for Paraguay to capture this business provided that the country has a competitive offering. Paraguay is well positioned in the region to cover this demand, due to the fact that shipbuilding is not as developed in neighboring countries.

Similar to shipbuilding, Paraguay is in a competitive position to increase its share of maintenance services, given the installed capacity and quality of work. Paraguay currently undertakes 95 percent of barge maintenance on the HPP and, according to industry sources, could expect this share to increase to approximately 97 percent if future demand is met by Paraguay-based capacity.

Industry expectations are that Paraguay will maintain its share of flags at 90 percent.[11] This will depend on Paraguay's ability to provide seafarer talent and a competitive flag. In terms of talent, Paraguay already provides most seafaring talent in the region, and it would need to provide further capacity in proportion to the additional vessels it plans to capture to maintain its flag share. This depends on the speed at which operators and the educational system can react to fully train the additional crews required. Regarding the efficiency of the flag, the registry must be simple and competitive, and there must not be significant limitations associated with carrying the Paraguayan flag.

[8] The share of port fees and bunkering fees that Paraguay can capture is not determined by Paraguay's competitiveness compared to other countries, so it is excluded from this analysis. Port fees are paid for goods imported or exported from Paraguay, and bunkering is proportional to the length of the trip that a convoy spends on a determined country's territory.

[9] Paraguay currently satisfies 60 percent of barge demand (including barge replacement and acquisition of new barges for increased cargo). The remaining 40 percent is imported from countries outside the region, mainly China.

[10] Expert interviews

[11] Having convoys under the Paraguayan flag means that 100 percent of the crew on the pushboats need to be Paraguayan. Therefore, the impact of maintaining flag share is measured in seafarer wages.

# D. Deploying best practices will allow Paraguay to capture its full shipping cluster economic potential

The HPP's full potential is estimated at 3 B USD in gross output or 1.8 B USD in value added for Paraguay, representing 4% of the country's 2023 GDP. To capture this full potential, Paraguay could follow a set of best practices that seek to replicate the success that other top global fluvial systems have achieved.

These best practices can increase Paraguay's competitiveness as well as the HPP's competitiveness in general. Given that Paraguay has up to 80% of the HPP[12] business, the country has a lot to gain from increasing The HPP's full potential is estimated at $3.0 billion in gross output, or $1.8 billion in value added for Paraguay, representing 4 percent of the country's 2023 GDP. To capture this full potential, Paraguay could adapt global best practices to its local context.

These best practices can increase Paraguay's competitiveness as well as the HPP's competitiveness. Given that Paraguay conducts almost 80 percent of the HPP business, it has a lot to gain from increasing HPP's competitiveness. To illustrate, if Paraguay only retains its share of flags, the country could provide talent to approximately 90 percent of convoys transporting increased cargo from Mato Grosso do Sul and Bolivia. Current exports of soy and corn from Mato Grosso do Sul are equivalent to Paraguayan exports (12 million tons), and, according to market experts, the HPP could be competitive for approximately 40 percent of this volume.

The six best practices that Paraguay could implement include maintaining a stable regulatory framework, developing a national navigability masterplan, fostering maritime education, promoting the development and application of maritime technology, fleet renewal, and a stronger collaboration between HPP member countries.

### 1. Maintain a stable regulatory framework

The potential impact of maintaining regulatory stability could materialize in an increase of the number of companies operating in Paraguay, and their contribution to the Paraguayan economy via their investments and operating costs, eventually increasing Paraguay's share of business on the HPP.

Currently, Paraguay has a stable environment, both in economic and regulatory terms. Paraguay has enjoyed steady economic growth (3.6 percent GDP CAGR between 2006–2022), with controlled inflation (approximately 4 percent), a competitive tax scheme (10 percent VAT, IRE, IRP), and a simple process for barge registration. These have been the key contributing factors in establishing Paraguay as a fluvial transportation hub.

However, Paraguay could further improve its regulatory framework. For example, avoiding regulatory changes in the barge registration by decree and reducing duplication in its barge registration processes are key to capturing a higher share of flags in the region.[13] The judicial system would also benefit from being able to respond in a timely fashion in case of disputes between parties.

Panama is an example of regulatory and economic stability, which has helped its establishment as a key logistics hub in the region. In terms of macroeconomics, the dollarized economy prevents currency risk and limits inflation. The income tax is 5 percent, and foreign companies have tax exemptions, which has led over 150 multinational companies to establish their headquarters in the country.

[12] Average of ship building, flags, maintenance, bunkering, lube oil, and provisions
[13] Currently, barges need to be registered on three different registries: the merchant marine, the prefecture, and private goods.

### 2. Develop a navigability masterplan

Developing a national navigability masterplan would be key in reducing idle time, and in increasing transit capacity and planning capabilities for stakeholders on the HPP, potentially lowering carbon emissions by reducing trip length.

Paraguay does not currently have a navigability masterplan. Ad-hoc maintenance and dredging is carried out by the government and private sector. This results in lower levels of maintenance and dredging, reducing navigability, and causing delays. These delays can further increase the cost of navigation with split convoys and operational delays. Navigability issues affect all HPP stakeholders, including convoy operators, ports, and cargo owners.

To illustrate, the Mississippi River has had a masterplan since 1930, which is renewed every five years. It ensures a continuous navigable channel of a minimum nine-foot depth, with a budget of $135 million per year for dredging and maintenance. At a federal level, the US Army Corps of Engineers drafts the masterplan and plays the primary role in managing and maintaining the navigation of the channel (dredging, regulating locks and dams, issuing permits). At a state level, transportation departments manage port facilities and ensure the smooth flow of freight while environmental agencies enforce water quality regulations. The government has undertaken the responsibility of the masterplan and awards dredging contracts via public tenders.

### 3. Focus on maritime education

Talent availability (both onshore and offshore) will be key as Paraguay reenforces its position as a logistical hub in the region, building and operating the convoys that travel on the HPP. Most of the increase in cargo volume expected in the next five to six years will come from Brazil, and Paraguay's ability to capture that business will depend to a large extent on the availability of talent—of seafarers as well as onshore staff.

Currently, Paraguay trains seafarers at the Navy Nautical School, which has approximately 160 technicians graduating each year. Beyond these degrees, private companies also train their own crews and teams. However, this process takes five to eight years and even if companies invest in training seafarers, the delay could cost Paraguay a share of new barges.

The Philippines has the largest seafarer crew globally. It achieved this by establishing

efficient collaboration between government agencies and private sector operators to maximize the number of people graduating each year, establishing continuing education credits and leveraging technology to develop cutting-edge educational programs such as simulators and training sessions.

### 4. Promote maritime technology

Leveraging two technological developments, (a) the digitalization of customs processes, and (b) the use of tracking technology on convoys can further improve navigation efficiency. The application of these technologies has the potential to increase the number of round trips a convoy can do per year, reducing idle time (from dry docking to submit customs documents manually, to mooring at night due to low visibility).

Creating an interface between the shipping ecosystem and technology players can accelerate investments and the adoption of new technologies. Singapore is an example of a shipping ecosystem that has prioritized technology investments. The country has established a fund through which the Maritime Port Authority and the government's SEEDS Capital work together to incentivize the development of use of new technology in the start-up ecosystem.

### 5. Promote fleet renewal

Fostering fleet renewal is important to strengthen the shipyard industry, ensure quality of service, limit disruption due to barge failures, and reach decarbonization goals faster.

As Paraguay strives to retain its place as shipbuilder of the region, financing is key to ensure that shipyards can satisfy increasing demand. In recent years, barge operators have increased the percentage of barges that they lease as opposed to purchase. This links shipbuilders' production capacity to their capacity to finance vessels and barges.

South Korea is the world's leading shipbuilder, and it is an example of establishing different financing alternatives so that access to credit does not limit the shipbuilding industry. South Korea's Export-Import Bank offers loan guarantees and subsidized interest rates for shipbuilding projects. There are tax incentives for R&D investments, depreciation, and export income, while public–private partnerships facilitate risk sharing.

### 6. Promote a stronger collaboration framework between HPP countries

Brazil, Bolivia, Paraguay, Uruguay, and Argentina signed the Treaty on the Rio de la Plata Basin, which is governed by the Comité Intergubernamental de la Hidrovía Paraguay-Paraná and aims to ensure the free navigation of cargo along the HPP. There is an opportunity to build a stronger collaboration between member countries to enhance navigability and reduce transportation costs.

This could increase the volume of cargo transported, particularly for Brazil and Bolivia, which have other competitive transportation options.

The Rhine-Main-Danube governance is a good example of regional coordination, since the river also passes through several countries. For the Rhine-Main-Danube, navigability is ensured by intergovernmental institutions such as Central Commission for the Navigability of the Rhine and the Danube Commission. The European Commission coordinates transport policies, promotes environmentally friendly practices, and funds infrastructure projects, while each country has a national agency responsible for infrastructure, maintenance, and navigation safety within their jurisdiction.

# Conclusion

Trade on the HPP currently generates $1.1 billion in gross output, an economic impact that could reach $3.0 billion by 2030. This increased impact would be driven by larger volumes of cargo transported on the HPP (particularly an increase in iron ore), and an increase in Paraguay's share of transport levels on the HPP. To ensure that Paraguay captures the benefit of increased cargo on the HPP, there are best practices the country could implement. These include maintaining a stable regulatory framework, developing a national navigability masterplan, fostering maritime education, promoting the development and application of maritime technology, fleet renewal, and a stronger collaboration between HPP member countries.

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