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Paraguay:

Country Private Sector Diagnostic

FEBRUARY 2025

About the Country Private Sector Diagnostic

The private sector is the engine of long-term economic growth and a vital catalyst for global social and economic development. When functioning well, the private sector promotes innovation and entrepreneurship, improves access to and the quality of economic opportunities, and supports the sustainable use of natural resources. In developing economies, the private sector creates most jobs, generates tax revenue, and accounts for significant investment.

The revised Country Private Sector Diagnostic (CPSD) reports seek to unlock private sector–led growth and investment. Prepared jointly by the institutions of the World Bank Group, each report discusses the overall business environment within a country and provides an analysis of specific sectors in which private sector investment could accelerate growth, if appropriate policy and regulatory issues are addressed.

Designed from the perspective of an investor or entrepreneur, this new generation of reports seeks to identify untapped private investment opportunities and the barriers that stand in the way (earlier reports can be found here). The sector opportunities are chosen based on their potential to spur private investment, create jobs, generate domestic revenue, and foster sustainable, inclusive growth, in response to targeted policy action. The report aims to help country policymakers prioritize the most impactful actions that can boost private sector growth, while delivering on broader development goals.

The CPSD is one of the World Bank Group's core country diagnostics produced to guide the design and implementation of public and private investment projects, budget support operations, advisory services, and other analytical work. It is intended to be of interest to domestic and foreign business investors, government officials, World Bank Group staff and management, civil society, and other development partners.

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Acknowledgments

The Paraguay Country Private Sector Diagnostic was prepared by staff from across the World Bank Group. The core team was co-led by Veronica Navas and Maria Kim, and included Luciana Harrington, Javier Gomez Restrepo, Samuel Rosenow, Adrian Fossaceca and Guillermo Terol. The extended team included Ariel Chirom, Ernesto Cabrales, Julio Flores Salvatierra, Santiago Marron Ruiz and Nathalia Rodriguez. Adama Badji, Rosa Arestivo de Cuentas Zavala and Viviana Molinari provided ample administrative support to the team.

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Executive Summary

Paraguay offers significant opportunities for private sector-led growth due to its abundant natural resources and solid macro-fiscal framework. Over the past two decades (2003–2023), Paraguay's real Gross Domestic Product (GDP) grew at an average annual rate of 3.7 percent, outperforming both the Latin America and Caribbean (LAC) region and upper middle-income countries (UMICs). This growth was underpinned by substantial hydropower resources and strong agricultural exports, positioning Paraguay as the world's third-largest exporter of soybeans and among the top exporters of beef and electricity.

The country is divided by the Paraguay river into two geographic regions: the Eastern Region ("Región Oriental") and the Western Region ("Región Occidental," also known as the Chaco). The Eastern Region is home to 97 percent of the population, benefits from fertile soils, strong agricultural production, and substantial hydropower resources while the Western Region is home to 3 percent of the population and has arid soil, remains less developed and is reliant on cattle ranching.

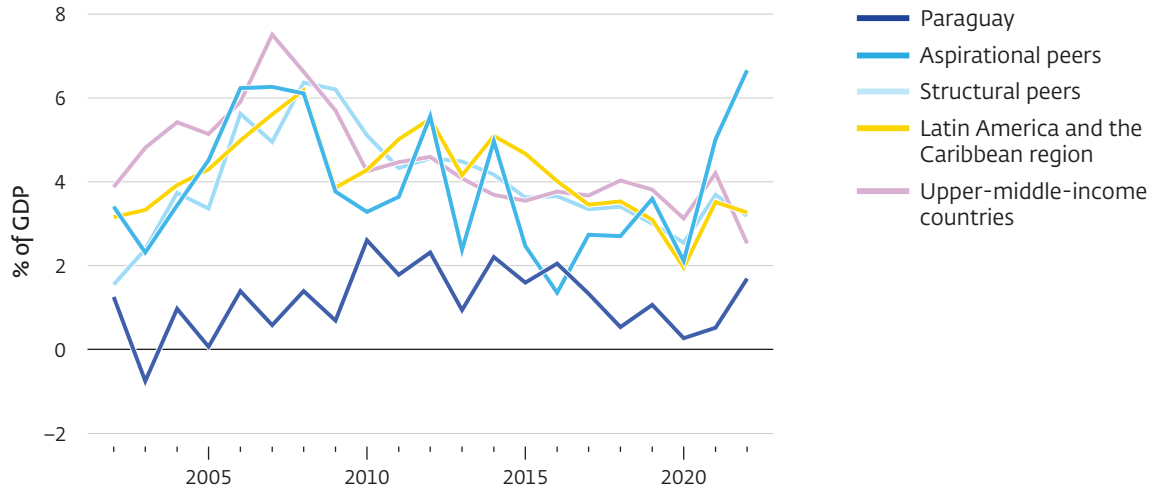
Paraguay maintains a competitive tax environment with a low tax burden of 9.9 percent of GDP, which is below the 15–20 percent average range for LAC countries and countries with a similar level of economic development. This has been a key value proposition for policymakers, yet despite tax exemptions, net FDI inflows have remained modest (figure ES.1), averaging less than 1 percent of GDP over the past five years. Constrained by Paraguay's low tax regime, public investment averaged 3.5 percent of GDP between 2002–2019 (figure ES.2), 34 percent lower than the average for LAC over the same period.[1]

To capitalize on its assets, Paraguay will need to address barriers that have historically hindered growth and private investment. These cut across various industries and, according to the World Bank's Enterprise Survey, include corruption, lack of affordable long-term finance, and low workforce skills (figure ES.3).[2] The Paraguay workforce continues to grow, with increasing employment in higher productivity sectors, but shortcomings in access and quality of education discourage private investment requiring more highly skilled workers. Despite a lower level of education compared to

Figure ES.1

FDI inflows in Paraguay are low relative to comparators

Net FDI inflows, 2002–22

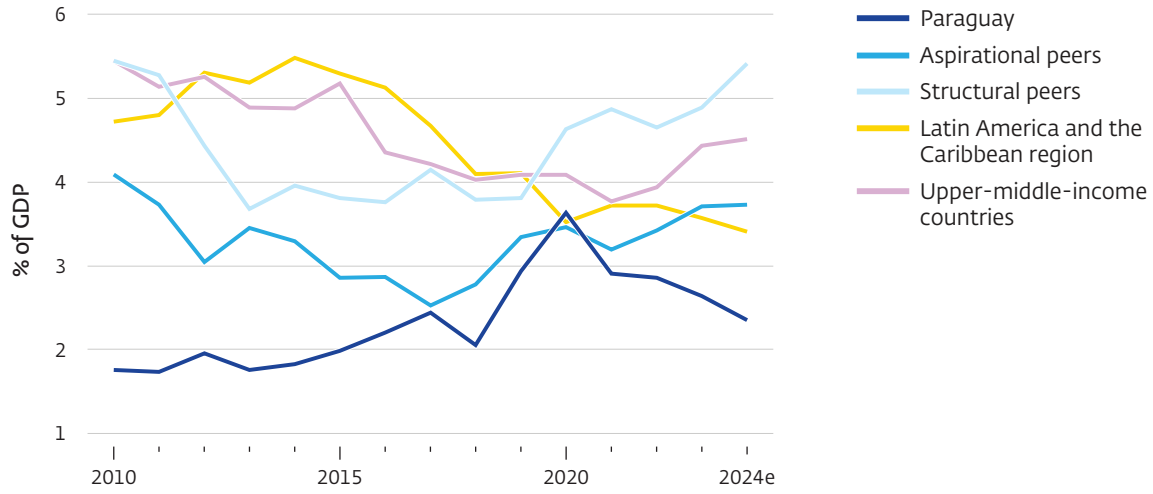


Sources: Staff calculations using WDI and BCP.

Figure ES.2

Public investment in Paraguay trails peers

General government capital expenditure, 2010–24e



Source: Staff calculations using World Bank's Macro-Fiscal Model.
Note: e = estimates. General government capital expenditure refers to the funds the government allocates for the construction or maintenance of long-lasting infrastructure, such as roads, bridges, schools, and hospitals. This spending focuses on physical assets that provide value over an extended period. Unweighted averages for peer groups. Structural peers include Tunisia, Guatemala, Armenia, and Albania—countries that share similar structural economic characteristics with Paraguay. Aspirational peers are Uruguay, New Zealand, Croatia, and Costa Rica— countries that have achieved higher levels of economic development and are seen as models for Paraguay's growth trajectory. UMIC stands for Upper Middle-Income Countries, a group of nations classified by the World Bank based on income levels.

Figure ES.3

Main obstacles to conducting business

Top business environment obstacles faced by formal firms

Sources: IFC internal estimates (2020), World Bank (2020), Honduras Comisión Reguladora de Energía Eléctrica (2024).

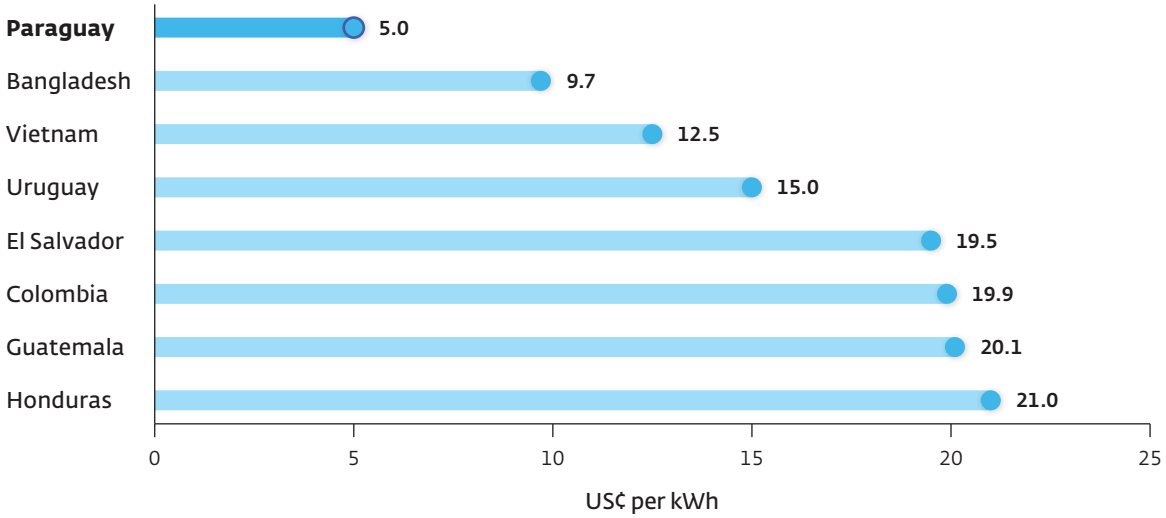
regional peers, employers in Paraguay do not report a significantly higher concern about the availability of appropriately educated workers than other upper middle-income countries in the region.[3] Maintaining and extending transportation infrastructure is needed, especially for export competitiveness. Moreover, despite abundant hydropower generation, underinvestment in electricity network infrastructure has undermined the reliability of the power supply, creating uncertainty for private enterprises. This is partly due to tariffs that do not reflect the true costs of operation and maintenance (figure ES.4).[4]

Paraguay's business environment is characterized by infrastructure challenges that directly affect sectors reliant on stable electricity, water, and digital services (figure ES.5).[5] The World Bank's B-Ready Report (2024)[6] assigns Paraguay a Utility Services score (which covers electricity, water and internet) well below the median for all countries in the report, reflecting inefficiencies, particularly in electricity and water infrastructure. Paraguay's Operational Efficiency score, which measures the ease and efficiency with which businesses can operate and comply with government regulations after being established, is below the median, and lowest for the competition indicator. Paraguay performs well on the Financial Services indicator, reflecting strong financial regulations, accessible credit infrastructure, and efficient lending, transactions, and electronic payment systems.[7] However, relatively low scores in Dispute Resolution and Business Insolvency reflect shortcomings in its insolvency frameworks that hinder business restructuring and conflict resolution. Overall, Paraguay's regulatory environment is stable.

Figure ES.4

Cheap Paraguayan power

Electricity prices in benchmark countries, 2023



Source: WB Paraguay Enterprise Survey.

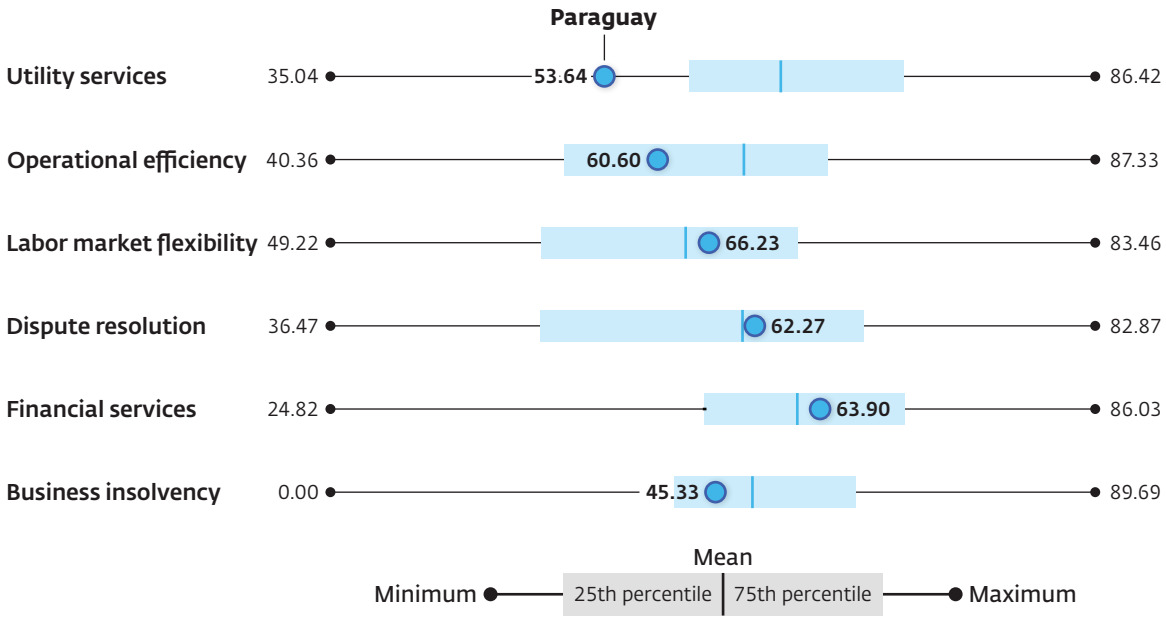
This CPSD delves into five sectors which have potential to attract significant private investment if recommended policy actions are taken: rice, pork, forestry, solar photovoltaic energy generation, and textiles and apparel manufacturing. These sectors were selected based on their potential to attract private capital, the feasibility of removing key constraints over the near term, and their development impact, including their potential to develop and diversify the economy. Diversifying into new products would reduce export concentration and associated vulnerabilities. Sustainable expansion of agricultural production is crucial for reducing poverty, especially in rural areas. Additionally, expanding and diversifying energy sources enhances energy security, reduces pressure on unregulated forest use, and positively impacts poverty reduction. The report estimates that the combined potential increase in private investment for rice, pork, sustainable forestry, and textiles and apparel could be as much as US$1 billion, cumulative, through 2030. For solar generation, additional private investment could be as much as US$2.6 billion through 2040.

The recommendations set forth below can boost interest on the part of private investors in the selected sectors. However, these opportunities will require concerted investment in the infrastructure and public services needed for a competitive modern economy. If Paraguay were to achieve FDI equal to the regional weighted average for foreign direct investment as a share of GDP, this would generate an additional net inflow of about US$1 billion per year.

Figure ES.5

Paraguay has room to improve on key dimensions of its business environment

B-READY indicator comparison: Paraguay vs. other countries, 2024



Source: World Bank, Business Ready (B-READY).
Note: The boxes in the figure represent the 25th to 75th percentile scores for the 50 economies studied in the B-READY report, with the number below each bar indicating the median score. Data is from 2024; the scores range from 0 to 100, where 100 represents the best performance.

Sustainable Rice and Pork Production

Rice and pork production that meets internationally recognized environmental, social, and governance (ESG) standards offers profitable growth and diversification opportunities for Paraguay's agricultural sector, which currently is concentrated in soybeans and beef. Areas suitable for rice cultivation are located in lowlands in the eastern region, unsuitable for soybeans or other crops, while pork production offers value added potential by converting grain into animal feed and integrating it into the meat value chain. Although rice is a major source of methane emissions, and pork is also GHG intensive, management practices and new production methods can minimize and mitigate the environmental impact.

Rice production benefits from Paraguay's favorable agroecological conditions and access to water resources. Despite recent growth, only 20 percent of Paraguay's land suitable for rice production is currently planted, indicating significant potential for expansion. In 2021, Paraguay's main regional competitors were Brazil, Argentina and Uruguay. In recent years, improved management practices have contributed to higher productivity, raising average

yields in Paraguay from about 5 tons/ha in 2010 to more than 6.5 tons/ha. These yields are close to Argentina (6.8 tons/ha) and Brazil (6.9 tons/ha), and lower than for Uruguay (9.4 tons/ha).

Global rice demand is growing, and Paraguay is cost competitive. World rice consumption is expected to increase 1.1 percent per year on average by 2032 according to the FAO-OECD 2023 projection. Current production costs in Paraguay are lower than Mercosur peers. Paraguay benefits from lower irrigation costs, and lower land and labor costs than its peers. Recent investment in road infrastructure, such as the completed Villeta-Pilar Road, have connected lowlands with rice plantations, reducing transportation costs to markets.

Pork exports grew from 6,600 tons (US$13.4 million) in 2020 to 9,500 tons (US$32.0 million) in 2023. Paraguay exports pork to Uruguay and Taiwan and is currently seeking authorization to export pork to Chile, Korea and Japan. The global pork market is set to grow significantly. According to the OECD and the Food and Agriculture Organization, pork demand is expected to grow 15.7 percent by 2030 relative to 2018–2020, outpacing the projected 5.9 percent growth in beef consumption.

Paraguay is a competitive producer of animal feed, which represents 70–80 percent of pork production costs. Expanding pork production can increase value addition in the agriculture sector by transforming grain production into animal feed and integrating it into the meat value chain. Average costs of pork production are similar to those of Brazil's most competitive pork-producing states, and lower than major competitors including the Netherlands and Denmark.

Key constraints affecting both the rice and pork sectors include unpaved roads and limited electricity distribution, as well as the limited number of port facilities equipped to handle refrigerated cargo. For rice producers, other constraints include availability of high-quality seeds and varieties, which limits market access, and the sustainability of land use plans. In the pork sector, constraints include the need for certification as "Foot and Mouth Disease-free" to access premium export markets, environmental challenges related to waste management, and management of odor generation to address community concerns. Limited adoption of internationally recognized ESG standards has created reputational risk for potential private investors.

To address these constraints and manage associated risks, Paraguay will need to expand the network of secondary roads, improve maintenance of existing transport infrastructure, and expand and modernize refrigeration capacity at the ports on the Parana River.[8] Additionally, Paraguay could promote sustainability certification. For rice, there is a need to adopt a sustainability certification system like the Sustainable Rice Platform and enhance water management practices. For pork, government can strengthen technical and institutional support for producers and implement land use planning.

Assuming targeted policy actions are taken, private investment in rice could increase by as much asUS$300 million in the next seven to ten years.[9] This could lead to: (i) an additional 100,000 planted hectares, up from the current 175,000 planted hectares as of the end of 2023; (ii) an increase in rice production from 1.2 million tons to 1.8 million tons, and (iii) a 50 percent increase in rice exports. With reforms, private investment in pork production could increase by up to US$150 million, with the potential to triple production by 2030.[10] This would add more than US$350 million to the value-added of exports relative to exporting soybeans and corn, which are the main input for pork feed. Moreover, pork exports have the potential to US$420 million by 2030, up from US$32 million in 2023, adding to economic diversification, and creating more than 25,000 direct and indirect jobs.

Sustainable Forestry

The forestry sector in Paraguay has potential to grow. Soil and climatic conditions in its eastern region are ideal for commercial plantation forestry. Fast-growing *Eucalyptus* species in Paraguay have a mean annual increment (MAI) of 25–48 cubic meters per hectare per year, similar to Brazil but higher than Chile and Uruguay, with MAIs of 20–24 and 25–28 cubic meters, respectively. Currently, of the five million hectares suitable for fast-growing, commercial-grade plantations, only about 200,000 hectares are planted.

Today, the country's forestry value chain includes primary production of industrial roundwood from native forests and commercial plantations, primary wood transformation, and some secondary wood transformation. Almost two-thirds of Paraguay's wood production is biomass (e.g., wood fuel and charcoal). Much of the remainder is industrial roundwood that can be transformed into basic wood products. But Paraguay's wood exports are concentrated in lower value-added products. In 2023, Paraguay exported US$53 million in charcoal, representing 56 percent of total wood exports from Paraguay. The export of plywood, veneered, and laminated wood accounted for 19 percent in volume, with a value of US$18 million.

Paraguay's first pulp mill investment, announced in 2018, for US$4 billion, was the country's largest private investment announcement to date. As of May 2024, 108,443 hectares of eucalyptus had been planted for this project which could help formalize domestic wood product markets and create more value addition.[11] It also has the potential to be transformative for the sector, in the same way pulp mill investments were for Uruguay and Chile over the last twenty to forty-five years.

Sustainable production of wood from plantations for both domestic use and export has significant profit potential. Based on internal calculations, biomass, solid wood and wood production for pulp log investment projects have potentially attractive returns. For

example, a solid wood production project would have an Internal Rate of Return (IRR) of 16 percent. Biomass and wood destined for pulp logs could have an IRR of 13 percent (after two rotations).[12]

Investments in the forestry sector could also boost growth and rural incomes. The sector creates more than 10 times the number of jobs per hectare as cattle raising. Those jobs pay on average salary of US$588 a month, twice that of the cattle industry.[13]

Despite recent improvements in the legal framework—for example, Law No. 7424, which creates the Unified National Registry and Cadaster System and the Unified National Registry (RUN)—land cadaster and secure tenure conditions remain a key constraint to development in the forestry sector for investors. Other constraints include delays in obtaining environmental licenses and high logistics costs. Access to long-term financing is inadequate, with local banks having limited capacity to assess credit risk in forestry, favoring known clients with non-forest collateral. Implementation of the recommended policy actions (see table ES.1) could catalyze between US$192 million to US$242 million in investment by 2030.

Solar Photovoltaic Generation

There are potentially profitable opportunities in solar photovoltaic (PV) generation. Paraguay currently produces more hydropower than it can consume, exporting 58 percent of its generated electricity to Brazil and Argentina. However, domestic demand has been growing and the government expects it to exceed existing generation capacity by 2037 (figure ES.6).

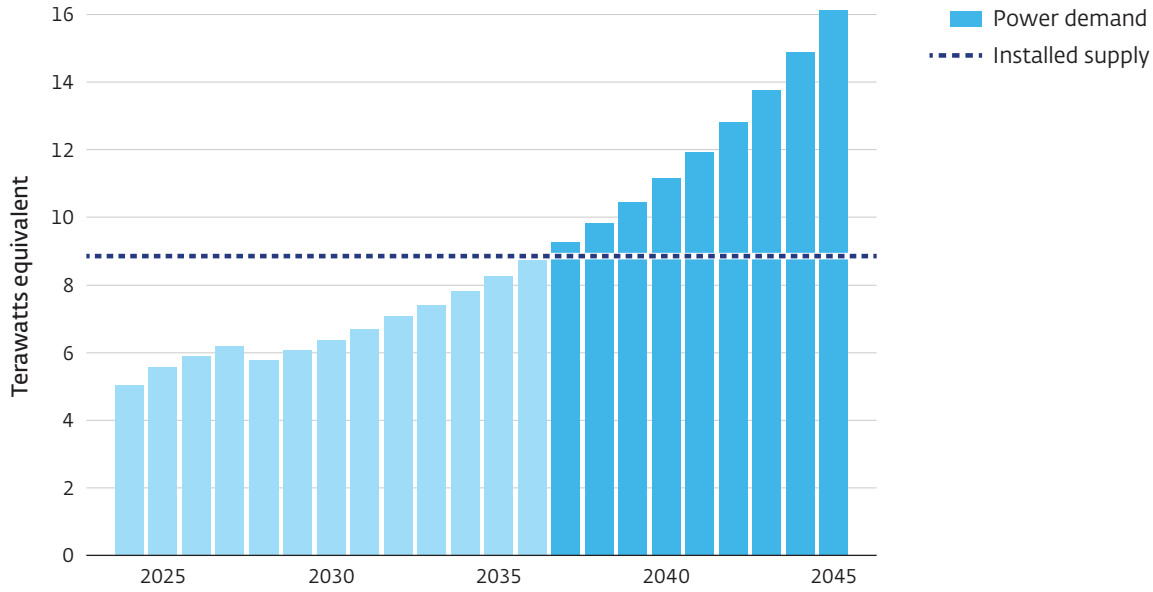
Hydroelectric power generation is vulnerable to climate change. Paraguay can expand and diversify its power sources by building on its solar potential, which can reach communities that currently lack reliable access to the grid. At the same time, increased power generation without improvements in transmission and distribution would not provide the reliability that private firms and households require.

Power generation, transmission, and distribution are currently dominated by the public sector. To attract private investment, Paraguay will need to strengthen its regulatory and institutional framework, establish market mechanisms for energy pricing, and allow private sector participation in grid infrastructure, including by allowing solar power generated to be sold and delivered directly to end users at a freely negotiated price. Long-term power purchase agreements can be structured to encourage project bankability and reduce uncertainty regarding grid access and prices. Implementation of reforms recommended in this CPSD has the potential to generate up to US$2.5 billion in investment by 2040.

Figure ES.6

Power demand will exceed supply by 2037

Solar photovoltaic generation



Source: World Bank staff simulations based on ANDE's (2021) Generation Plan.
Note: Power demand is projected to grow at the annual rate (4.4 percent) observed in the last three years for which data are available (2021-2023).

Textiles and Apparel

Paraguay's textiles and apparel industry has room to grow from its current size (about 1 percent of GDP, employing just 0.2 percent of the labor force). The industry would profit from closer integration with the global market, which is expected to double by 2031, driven by fast fashion. Two-thirds of Paraguay's textiles and apparel exports go to Brazil, a growing consumer market. Expanding Full Package Production (FPP)[14] can help companies reach higher value export markets and increase value addition, as well as create higher paying jobs in fashion design, marketing and sales.

Inefficiencies in infrastructure and customs processes result in prolonged lead times in this sector, raising costs, and reducing profitability. Efficiency could be enhanced if the use of electronic invoicing (a precondition for factoring—a common financing modality for working capital) was required by the government. This would also help address the sector's limited access to working capital. Upgrading skills would also better enable the industry to expand into FPP and capitalize on global trends. Implementation of the policy actions recommended in this CPSD could help catalyze up to US$44 million in direct investment by 2028.

Table ES.1

Summary of recommendations

Sector	Recommended actions
Sustainable agribusiness in rice and pork	
Rationale • Favorable agroecological conditions, clean energy, access to water resources, low costs of land and labor. • Growing global demand for pork. • Paraguay is competitive in animal feed. **Constraints** • Absence of comprehensive land use planning. • Limited adoption and enforcement of international ESG standards. • Infrastructure and logistics weaknesses. *Rice* • Limited access to quality seed varieties. • Lack of formal system for sustainability certification. *Pork* • Inadequate standards for livestock sanitary status limits access to premium markets. • Absence of monitoring, planning and certification systems.	• Adopt land-use plans to define rice and pork production areas, while protecting critical habitats and taking into account hydrological impacts. • Establish and enforce improved sustainability standards. • Build and improve maintenance of secondary roads to better connect farms to transport infrastructure. *Rice* • Support development of new rice seed varieties. • Implement targeted extension services for rice producers. • Adopt a sustainability certification system such as the Sustainable Rice Platform. *Pork* • Speed implementation of "compartments" project initiated in the UPISA Cluster. • Strengthen SENACSA's technical/institutional capacity. • National Administration of Navigation and Ports (ANNP) to modernize refrigeration equipment.
Forestry	
Rationale • Eucalyptus growth rate levels among highest in the world. • Large share of land available for commercial forestry. **Constraints** • Difficulties with land cadaster and secure tenure conditions for investors. • Cumbersome environmental licensing process. • High Internal freight costs. • Delays in registering forests to be used as collateral. • Unreliable system for granting and controlling transit permits for forest products. • Absence of national biomass program and registry for producers.	• Set up a computerized information system for the exchange of cadastral and registry data and make it accessible to everyone involved in land transactions. • Prioritize the availability of cadastral information for areas with forestry investment potential. • Revise Terms of Reference for Environment and Social Impact Assessments to meet international standards. • Introduce single window for *forest surface rights registration* procedures. • INFONA to work with other institutions to better control illegal uses of transport permits. • Implement National Biomass Certification Program.

(Table continues next page)

Table ES.1

Summary of recommendations *(continued)*

Sector	Recommended actions
Solar PV generation	
Rationale • Rising domestic energy demand in the medium term. • Secure supply of renewable energy would enable decarbonization other sectors (e.g., fertilizers). **Constraints** • Inadequate institutional framework to incorporate new (more expensive) energy sources and private players. • Lack of clear rules for access to the grid by investors. • Insufficient transmission and distribution infrastructure.	• Achieve cost recovery through the use of competitive mechanisms to determine prices for energy purchased by ANDE. • Allow private investors to undertake grid expansion projects through PPP schemes. • Specify the conditions for private investors to access the grid. • Allow private investors in solar generation to sell and deliver electricity directly to end users at a freely negotiated price.
Textiles and apparel	
Rationale • Low labor costs, low corporate taxes, and trade incentives under Mercosur. • Increasing global demand for apparel and fast fashion. **Constraints** • Access to working capital, affordable loans for investment. • Customs delays at borders with Brazil and Argentina.	• Promote factoring to finance working capital through mandatory uptake of national integrated electronic invoicing system (SIFEN). • Increase interoperability between single window for imports and single window for exports. • Fully digitize the customs dispute process. • Expand "Authorized Economic Operator" status.

1

Country Context

1 Country Context

Paraguay has the potential to attract significant private investment. Despite its small size and landlocked location, Paraguay has capitalized on its fertile soils to establish itself as an exporter of agricultural products and livestock.

The country is divided by the Paraguay river into two geographic regions: the eastern region ("Región Oriental") and the western region ("Región Occidental," also known as the Chaco). The eastern region, home to 97 percent of the population, benefits from more favorable infrastructure, soil conditions and agriculture production, El Chaco, with 3 percent of the population and arid soil, remains relatively underdeveloped and reliant on cattle ranching. Two of the country's rivers generate hydropower in excess of domestic demand through binational dams with Argentina and Brazil allowing sizable exports of electricity. Natural capital makes up 16 percent of the country's total wealth, a higher share than that of regional comparators.[15] Paraguay benefits from a prudent macro-economic framework and membership in the Mercosur trade block. These assets, if leveraged alongside improved infrastructure and a more transparent rules-based business climate, bode well for enhancing Paraguay's appeal as a destination for private investment.

Macroeconomic management has been prudent. Paraguay's robust macro-fiscal framework has been key to its growth performance, with real GDP increasing by an average of 3.7 percent annually over the past two decades (2003–2023), surpassing the

averages of both the Latin America and Caribbean region and upper-middle-income countries. Over the medium term, growth is projected to exceed three percent. Although convergence to the Fiscal Responsibility Law ceiling has been delayed until 2026, the public debt-to-GDP ratio is projected to be on a downward trajectory over the medium term, to less than 40 percent by 2029.[16] Likewise, inflation is expected to stabilize at four percent in the medium term, consistent with the target of Paraguay's Central Bank. The Central Bank has maintained a well-functioning inflation targeting regime and a floating exchange rate, intervening occasionally to smooth exchange rate fluctuations due to the thin FX market and seasonality of FX flows.[17] Prudent policies are reflected in Paraguay's investment grade upgrade by Moody's in July 2024, to Baa3. This upgrade also reflects robust economic growth and a series of institutional reforms.[18]

Attracting more private investment and diversifying the economy are crucial for creating quality jobs and reducing poverty. Despite the growing economy, poverty and inequality remain significant challenges, exacerbated by the country's vulnerability to external shocks, including climate-related events. According to the World Bank Poverty Assessment for Paraguay, 24.7 percent of Paraguay's population lived below the national poverty line in 2022, with 5.6 percent in extreme poverty. Although this represents a significant reduction from 51.4 percent in 2003, progress has slowed in recent years. Climate shocks, such as droughts and floods, have contributed to this slowdown, particularly affecting rural areas and agricultural livelihoods. In 2022, nearly 40 percent of poor rural workers reported reduced working hours due to adverse weather conditions, compared to just 13 percent of non-poor workers.

1.1 Paraguay's Advantages and Challenges

Among other advantages, Paraguay has a competitive agricultural sector, concentrated in the production and export of soy and beef. The country's competitiveness in soy and corn production gives it an advantage in animal feed production, positioning it well to expand pork production, for which global demand is growing rapidly. The *Ruta Bioceanica*, a project to connect the Atlantic and Pacific Oceans by building a road through Paraguay, Argentina, Chile, and Brazil, is under construction and will reduce transport costs in the medium term, improving the sector's competitiveness.

The land and climate conditions in Paraguay's Eastern region support high yields for forestry products. Pastureland in the eastern part of the country along the Paraguay River has considerable potential for fast-growing commercial-grade forest plantations due to a combination of soil properties and propitious rainfall. Subtropical climate and land conditions result in tree growth rates among the highest in the world. This, coupled with increasing global demand and its ability to contribute to carbon sequestration, aligns the sector with government priorities and has potential in terms of development impact.

Table 1.1

Economic indicators

Paraguay	2010–19 (averages)	2020	2021	2022	2023	2024 (estimates)	2025 (projections)	2026 (projections)
GDP (US$, billions)	36.3	35.4	40.0	42.0	43.0	46.1	...	...
Real GDP growth (%)	4.3	−0.8	4.0	0.2	4.7	3.9	3.6	3.6
PPP GDP per capita (constant 2021 international $)[a]	14,209	14,992	15,406	15,259	15,783	...	...	...
Investment (% of GDP)	19.7	19.9	22.9	22.1	20.6	20.6	21.1	22.0
Inflation (%, period average)	4.2	1.8	4.8	9.8	4.6	4.0	4.0	4.0
Fiscal balance (% of GDP)	−0.9	−6.1	−3.6	−2.9	−4.1	−2.6	−1.9	−1.5
Public debt (% of GDP)	14.8	34.5	34.1	35.9	38.6	41.0	40.7	40.2
Current account balance (% of GDP)	0.4	1.9	−0.9	−7.1	0.2	−0.6	−0.9	−1.2
Gross reserves (US$, billion)	6.4	9.5	9.9	9.8	10.2	10.6	11.0	11.4
Total reserves (in months of imports)	6.0	10.4	8.3	6.9	6.8	6.9	6.8	6.7
FDI net inflows (% of GDP)	1.3	0.4	0.2	1.7	0.8	1.7	1.7	1.7

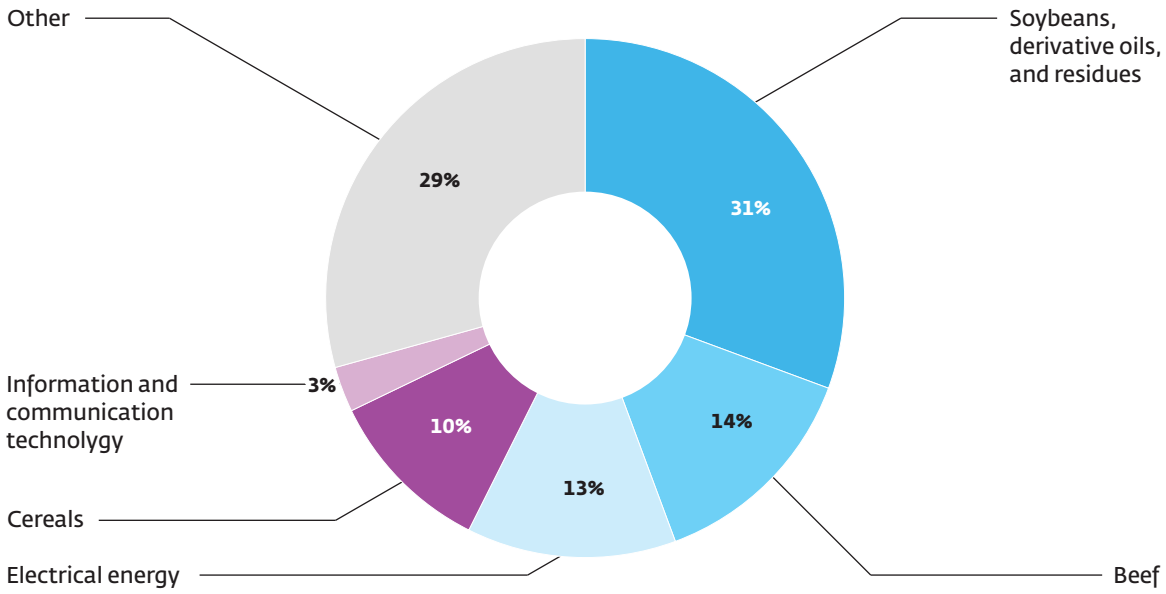
Sources: World Bank MFMOD database (October 2024), and World Development Indicators (WDI).
Note: Population: 6.8 million (United Nations World Population Prospects, 2023).
a. PPP GDP per capita is from World Development Indicators.

The structure of economic activity makes the economy vulnerable to climate change and movements in commodity prices. Exports are concentrated in a few sectors (agricultural products, livestock, and hydropower) (figure 1.1) which collectively account for four-fifths of exports and almost one fifth of GDP. Within agriculture, soybeans are predominant, making the country the world's fourth largest exporter. Livestock exports consist mainly of beef, for which Paraguay is among the top 15 exporters globally.[19] Reducing the volatility of output and sustaining economic growth will require generating profitable opportunities in a diverse range of products and moving up the value-added

Figure 1.1

Soybeans, beef and power lead exports

Composition of exports, by product category, 2023



Source: International Trade Center (ITC) calculations based on Banco Central del Paraguay statistics (2023).

ladder. To strengthen climate resilience, the government is implementing a set of adaptation strategies and, in parallel, and is making efforts to support mitigation initiatives and attract investments that drive green growth.[20]

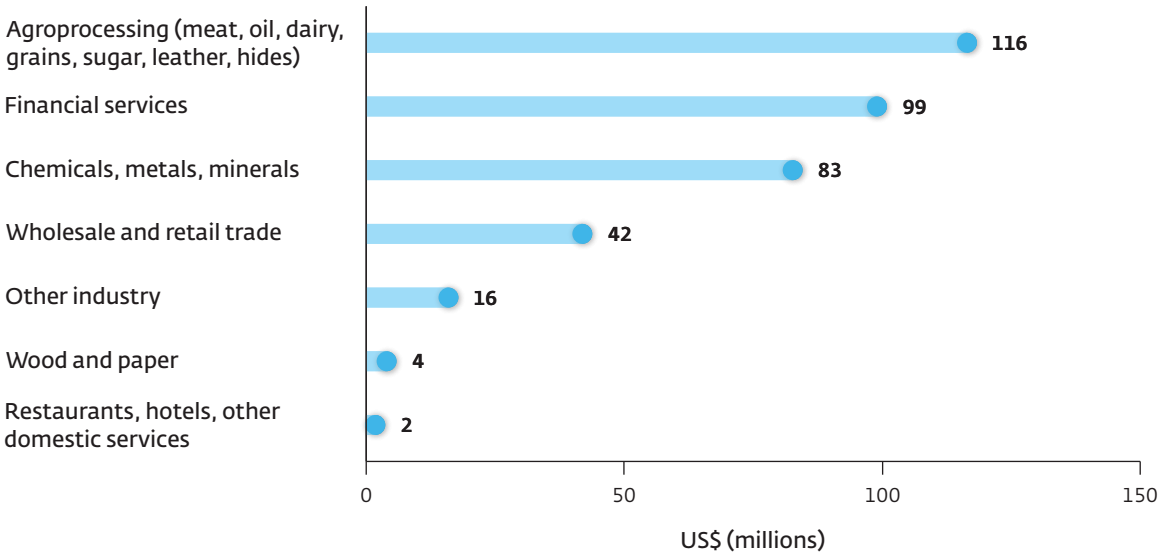
Foreign direct investment averaged 0.9 percent of GDP over 2019–2023, well below peers. In 2023, net FDI inflows to Paraguay as a share of GDP stood at 0.8 percent, well below the regional weighted average (3 percent), including Argentina (3.7 percent), Brazil (3 percent), and Chile (6.5 percent).[21] If Paraguay were to reach the regional weighted-average ratio of FDI to GDP, it would imply an additional net inflow of approximately US$1 billion per year. Low levels of FDI in Paraguay have been attributed to perceptions of weak institutions, inconsistent market rules, and poor enforcement of competition laws. Factors such as challenges related to organized crime, gaps in intellectual property rights protection, and concerns about illicit cross-border trade practices are seen to pose obstacles to attracting foreign direct investment, despite Paraguay's stable macroeconomic environment and low tax rates.[22 and 23]

During the past five years, the main destinations for FDI have been agro-processing and the financial sector (figure 1.2). Recent FDI announcements suggest emerging interest from investors for sectors such as paper (forestry), renewable energy, and communications (figure 1.3). This includes a recently disclosed US$4 billion investment in a

Figure 1.2

Realized net FDI flows to Paraguay by sector

Average annual investment in 2018–22

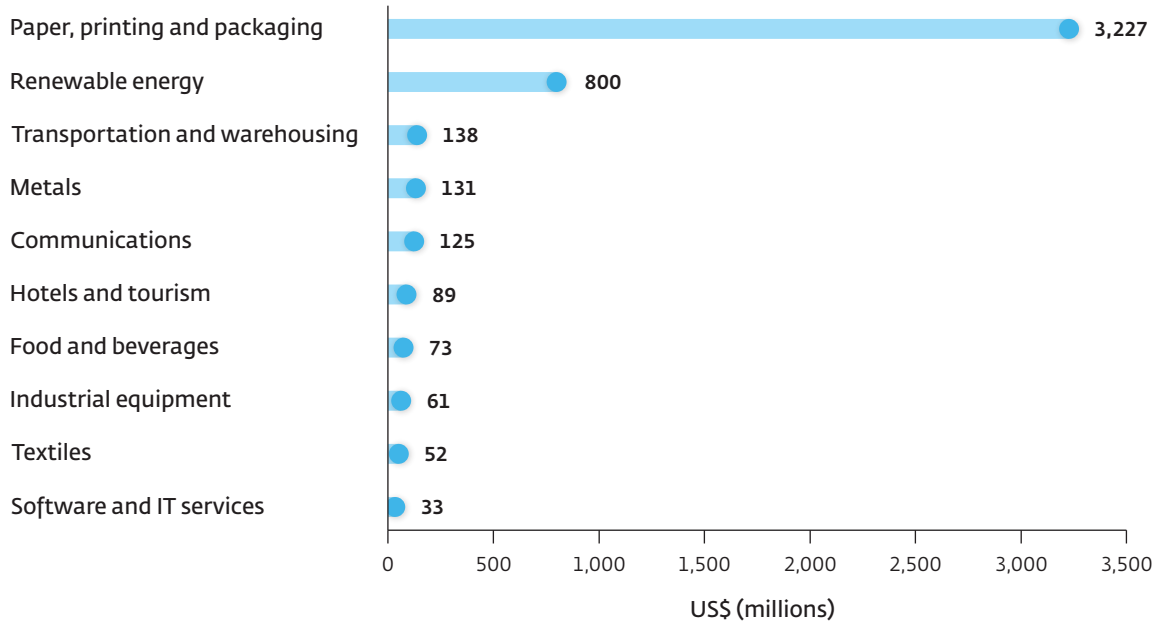


Source: Central Bank of Paraguay - BCP (2023).

Figure 1.3

FDI announcements in Paraguay by top-10 sectors

Investments in 2018–22



Source: fDi Markets (2023).

commercial plantation for pulp processing, along with other large ongoing projects in biofuels and forestry. If well managed and supported by a more efficient and effective public sector, these projects have the potential to demonstrate that Paraguay can attract profitable large scale private investment.

Paraguay's access to international financing has been stable at low levels. In February 2024, Paraguay launched a US$1 billion bond issuance on the international market, including a seven-year, guaraní-denominated bond worth 3.6 trillion PGY (US$501 million), Paraguay's first international issuance of a local currency bond and a 12-year, dollar-denominated bond for US$500 million. The guaraní bonds saw demand exceeding US$1.2 billion, more than double the supply, while demand for dollar-denominated bonds was eight times the amount offered. Proceeds are designated for public infrastructure projects and debt repayment.[24] As presented in table 1.2, international corporate bond issuances (percent of GDP) are slightly below the regional average and slightly above the income-group average but have decreased against the 5-year average. Loans from foreign banks to residents (all sectors, percent of GDP) are below peer group averages but increased in 2023.

While Paraguay's public debt burden remains relatively modest (although rising), relatively low revenue collection over the last decade has constrained its ability to

Table 1.2

Paraguay's access to international financing

	International corporate bond issuances (% of GDP)		Loans from foreign banks to residents (all sectors, % of GDP)		FDI flows (% of GDP)	
	2022	5Y average	2023	5Y average	2023	5Y average
Paraguay	1.4	3.2	4.1	3.7	0.8	0.9
Latin America and Caribbean	1.9	4.1	27.3	32.1	3.0	3.9
Upper-middle-income countries	1.3	3.3	10.3	12.8	4.9	3.8
Emerging markets and developing economies	1.5	2.7	17.0	19.8	3.5	3.2
IDA countries	1.0	2.0	15.6	15.0	3.7	4.1

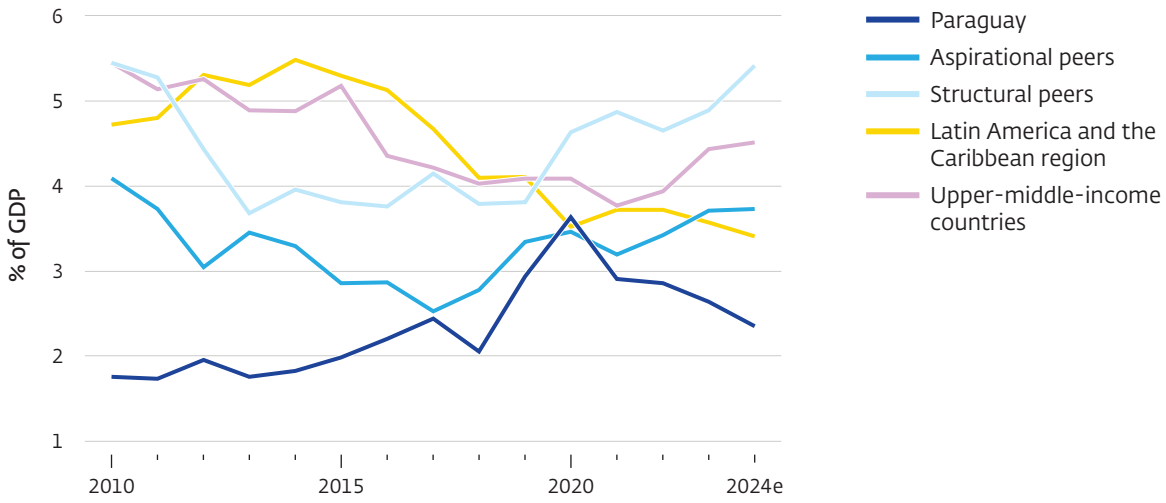
Sources: WBG calculations. Domestic financing (World Development Indicators, International Financial statistics, WB and OECD GDP estimates, BIS Domestic Debt securities, and World Federation of Exchanges database); International financing (Dealogic, BIS locational banking statistics, International financial statistics and BOP database, international debt statistics, WB and OECD GDP estimates, BIS).
Note: Paraguay's values are compared to the averages in the Latin America and the Caribbean region, upper middle-income countries (UMICs), emerging and developing economies (EMDE), and IDA countries.

develop the infrastructure and public services necessary to support a modern economy. Tight fiscal management in the face of low domestic revenue mobilization has kept public investment compressed (figure 1.4), preventing the development of the transport and energy infrastructure necessary for a modern economy.[25] Total revenue to GDP, while having risen recently, is also comparatively low. Tax revenue of about 10 percent of GDP is well below comparators in the region (figure 1.5) and for the same income group.[26] Diversified, climate-resilient, private sector-led growth will require targeted and strategic public investment and improvements in human capital and quality public services.

Figure 1.4

Public investment in Paraguay trails peers

General government capital expenditure, 2010–24e

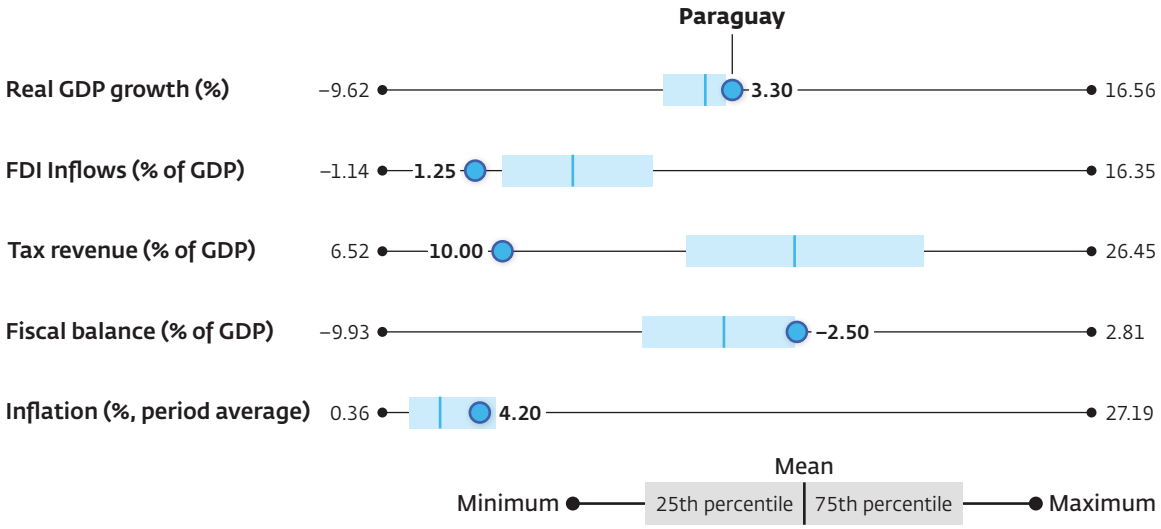


Source: Staff calculations using the World Bank's Macro-Fiscal Model.
Note: e = estimates. General government capital expenditure refers to the funds the government allocates for the construction or maintenance of long-lasting infrastructure, such as roads, bridges, schools, and hospitals. This spending focuses on physical assets that provide value over an extended period. Unweighted averages for peer groups. Structural peers include Tunisia, Guatemala, Armenia, and Albania—countries that share similar structural economic characteristics with Paraguay. Aspirational peers are Uruguay, New Zealand, Croatia, and Costa Rica, representing countries that have achieved higher levels of economic development and are seen as models for Paraguay's growth trajectory. UMIC stands for Upper Middle-Income Countries, a group of nations classified by the World Bank based on income levels. LAC refers to the Latin America and Caribbean region, to which Paraguay belongs.

Figure 1.5

Paraguay is growing somewhat faster than its regional peers

Macroeconomic and fiscal comparison of Paraguay with other Latin American countries, 2013–23



Source: IMF WEO April 2024, International Financial Statistics.
Note: The light blue boxes represent the 25th to 75th percentile of the Latin America and the Caribbean (LAC) distribution. Figures capture the median for Paraguay and all LAC countries for the years 2013 to 2023. Inflation variable excludes Argentina and Venezuela due to unusually high inflationary periods. In terms of revenue collection, for LAC countries and countries with a level of economic development similar to Paraguay, the tax-to-GDP ratio typically ranges from 15 percent to 20 percent.

Enterprise and other surveys identified several factors that discourage private sector development. According to the 2023 World Bank Enterprise Survey for Paraguay, corruption, access to finance, political instability, and access to reliable electricity present obstacles to firms and investors, (figure 1.6).

Corruption is the constraint to doing business most often cited by firms operating in Paraguay. According to the Worldwide Governance Indicators,[27] Paraguay is in the bottom fifth globally when it comes to control of corruption. Paraguay's Control of Corruption rating is –1.1, compared to an average of –0.4 for Latin America and the Caribbean (values in the region range from –1.7 to 1.6). In Paraguay, sixteen percent of firms (more than double the regional average) report having experienced at least one request for a bribe; more than one in five firms expects to make an informal payment or give a gift to obtain a construction permit (more than double the regional average) and 13 percent of firms expect to make unofficial payments in meetings with tax officials (compared to a regional average of five percent).[28] Corruption manifests itself in several sectors, including those that make intensive use of water, electricity, and imports, where firms report high

Figure 1.6

Main obstacles to conducting business

Top business environment obstacles faced by formal firms, 2023

Source: WB Paraguay Enterprise Surveys.

incidences of bribery and informal payments.[29] At the same time, there have been important advances in recent years in public transparency, including Paraguay's 2023 National Strategy to Combat Corruption.[30] A recent report identified several areas for improvement, including border and customs administration, public finance, special regimes, and rule of law,[31] with several actions having recently been taken to enhance border and customs administration, including the merger of the Customs and Tax Administration Units.

While aggregate domestic credit to the private sector as a share of GDP is above comparator averages, the share of firms identifying access to finance as the most pressing constraint to operating a business (18 percent) is more than 50 percent higher than the regional average (11 percent).[32] Two-thirds of firms finance the purchase of fixed assets internally, slightly higher than the average for the region. Access to external sources of finance is largely from domestic banks (table 1.3). Access to international and long-term financing for capital projects is scarce and costly in the relatively small domestic capital market (table 1.3). The government is pursuing regulatory reform to deepen capital markets and enhance access to local currency finance.

Paraguay produces an abundance of inexpensive hydropower[33] but weaknesses in network infrastructure, exacerbated by the low price at which power is sold, constrain its ability to provide a reliable supply of power to households and firms.

Table 1.3

Paraguay's access to domestic financing

	Domestic credit to private sector (% of GDP)		Bank credit penetration (% of GDP)		Private domestic bond market capitalization (% of GDP)		Public domestic bond market capitalization (% of GDP)		Stock market	
	2023	5Y avg.	2023	5Y avg.	2022	5Y avg.	2022	5Y avg.	Avg. no. of firms	Stock market capitalization to GDP (%)
Paraguay	51.4	50.1	51.4	50.1	4.6	n.a.	5.0	n.a.	52.0	<1
Latin America and Caribbean	47.0	49.5	43.9	46.2	13.7	13.6	39.3	39.9	121.2	48.2
Upper-middle-income countries	47.7	50.2	43.5	45.7	24.5	24.9	39.5	37.9	475.1	68.6
Emerging markets and developing economies	38.9	40.5	35.9	37.5	18.8	19.2	37.3	36.6	404.5	68.6

Note: Bank credit penetration refers only to claims by depository corporations in the private sector, while domestic credit includes claims by both depository and other financial corporations in the private sector. Since Paraguay has no reported data on other financial corporations, domestic credit figures are the same as bank credit figures. The 5-year average figures for the capitalization of private and public domestic bond markets are unavailable or not readily accessible.

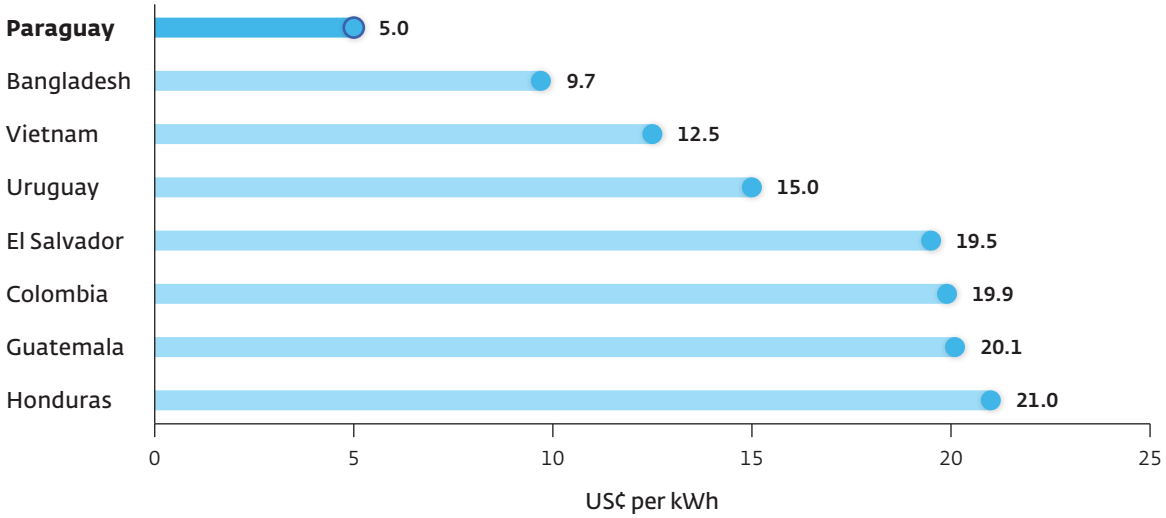
The price at which the state utility ANDE sells power to end users is well below regional comparators (figure 1.7). While this partly reflects the relatively low cost of hydropower generation in Paraguay, the price in Paraguay is below the operating expenses incurred across the value chain. Residential electricity prices in Paraguay are approximately 38 percent of the average in Latin America and the Caribbean, while business electricity rates are around 35 percent of the regional average.[34]

Electricity prices have been kept low in part due to the practice of linking transmission and distribution costs to the amount of energy delivered, rather than the capacity of the grid (how much power it can handle). This approach does not accurately reflect the true cost of maintaining and upgrading the network, as transmission costs are driven by the grid's capacity (kW), not by the energy transmitted (kWh) (see figure 6.2 in chapter 6). Tariff shortfalls and Capex are funded through revenues from electricity exports to Brazil and Argentina. The opportunity cost of cross subsidization has been underinvestment in other aspects of the power sector, resulting in poor operational performance of the national utility ANDE, unreliable service, and high losses in supply

Figure 1.7

Electricity prices are well below comparator countries

Electricity prices in benchmark countries



Source: IFC internal estimates (2020), World Bank (2020), Honduras (Comisión Reguladora de Energía Eléctrica, 2024).

(which could otherwise be exported).[35] Moreover, the low price paid by end users does not promote efficiency in consumption, contributing to domestic energy demand that could be avoided and exported at a higher price.

Reflecting the practices described above, Paraguay's indicators of energy reliability are among the lowest in the region. In 2023, more than three-quarters of Paraguayan firms experienced an electrical outage compared to just over half (53 percent) of firms in Latin America and the Caribbean.[36] In 2019, Paraguay had an average of 23 power outages per year, more than twice the regional average, with an average duration of 22 hours.[37] In 2023, overall energy losses were 27.8 percent (22.5 percent in distribution and 5.3 percent in transmission),[38] significantly above the rest of Latin America.

Efforts to attract private investment to transmission and distribution have been unsuccessful. Although Law 3009 attempted to bring private investment to the energy sector, ANDE's tight control over crucial infrastructure has limited competition.[39] Private investors also face uncertainty given an unclear separation of roles in the governance of the electricity sector.[40]

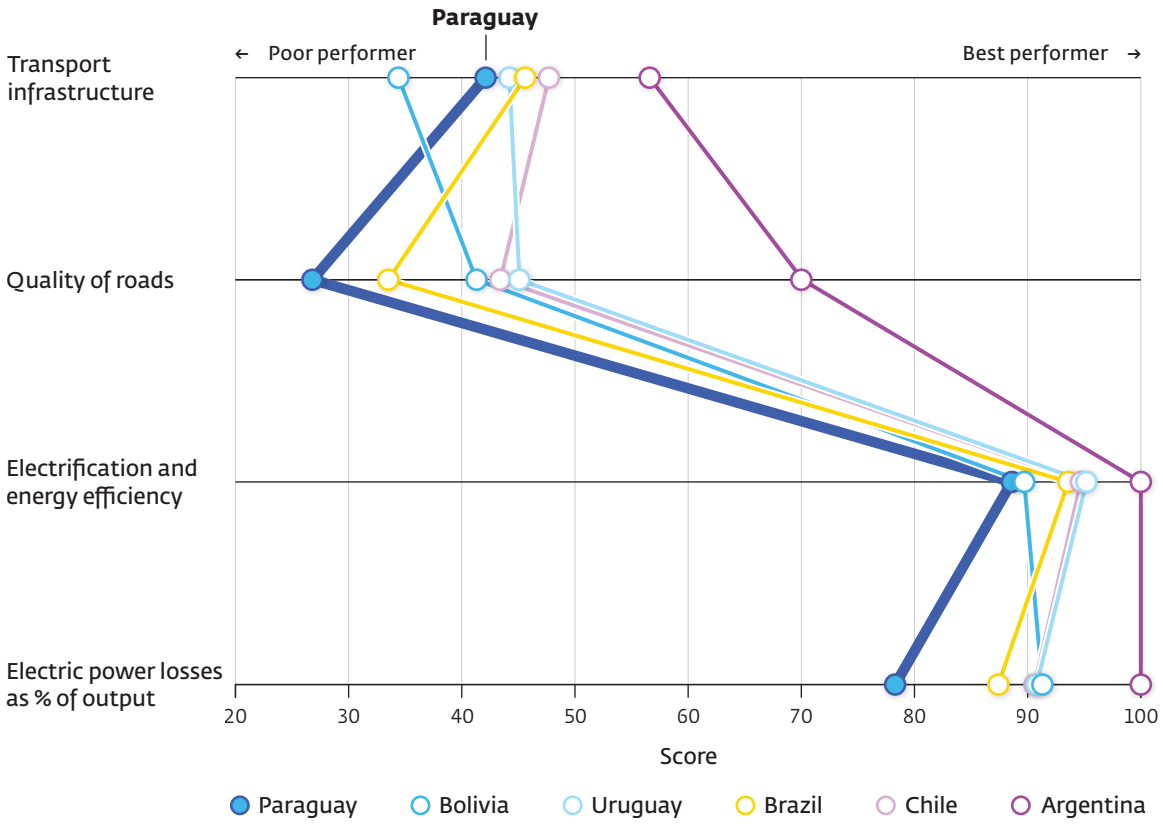
Deficiencies in Paraguay's transportation infrastructure also discourage private investment. The quality of Paraguay's transport infrastructure is among the lowest in the region (figure 1.8). Paraguay falls behind regional peers in terms of coverage, operational costs, inter-modal development and sustainability of its transportation infrastructure (CAF 2021).

Poor transportation infrastructure increases delays and trade costs, reducing Paraguay's competitiveness. Transport bottlenecks slow the customs and land routes between Paraguay and Brazil (e.g., Asuncion-Ciudad del Este–Foz do Iguacu–São Paulo). New bridges under construction between Paraguay and Brazil will help, but construction has been delayed. There are no direct train links between Paraguay and Brazil. Virtually all textiles are transported to Brazil by road, which is more expensive than water transportation. The Paraguay-Paraná waterway, which handles over 60 percent of the total export and import cargo, often faces navigational problems due to low water levels. Investing in dredging, either through government funding or Public-Private Partnerships (PPPs), requires trilateral agreement among the countries involved.

The large majority (87 percent) of transport companies in Paraguay are micro-enterprises with small and old fleets, typically 15–20 years old.[41] CAF estimates that if Paraguayan businesses were able to transport goods domestically at 90 kilometers per

Figure 1.8

Quality of transportation and energy infrastructure



Source: Global Competitiveness Index - WEF, 2019.
Note: Quality of transportation and energy infrastructure data is derived from the Global Competitiveness Index (GCI), a tool developed by the World Economic Forum (WEF) to assess the competitiveness of countries. Each pillar within the GCI is scored on a scale from 0 to 100, with 0 representing the worst possible outcome and 100 the best.

hour (the benchmark), they would improve their internal market access by 7.1 percent for every 6 hours of travel time. This means that with faster transport, businesses could reach a larger share of the population, expanding their potential customer base by an estimated 7.1 percent for each 6-hour increment in reduced travel time, enabling businesses to access a larger share of domestic demand.[42]

The Paraguay workforce continues to grow but shortcomings in access and quality of education discourage private investment that requires more highly skilled workers. Over the last decade, the working age population has continued to increase. This is combined with a relatively high labor force participation rate (as seen in table 1.4). The

Table 1.4

Employment and education indicators for Paraguay

	Paraguay	Latin America and Caribbean	Upper-middle income
Labor force supply			
Population ages 15-64 (as % of total population)[a]	64.8	67.6	68.3
Labor force participation rate (% of population aged 15-64)[b]	74.2	68.7	70.3
Learning-adjusted years of school[c]	7.0	7.8	7.9
School enrollment tertiary (% gross)[d]	38	58	64
Labor market conditions			
Unemployment, total (% of total labor force)[b]	5.8	6.3	5.7
% of firms identifying an inadequately educated workforce as a major or very severe constraint[e]	21.0	22.3	22.3
Employment by sector (% of total employment)			
Industry[b]	18.0	20.8	27.9
Agriculture[b]	17.2	12.6	20.4
Services[b]	64.8	66.6	51.7

Sources: Approach follows that used in the World Bank Group Growth and Jobs Reports.
a. World Development Indicators.
b. International Labor Organization, modelled figures for 2024.
c. Human Capital Index, learning adjusted years of school adjusts the years of school for how much students learn for each year they are in school. This is done using results from standardized tests.
d. UNESCO. All countries are the latest available, Paraguay is from 2010.
e. Enterprise Surveys (latest available results, Paraguay from 2023).

increase in the working age population has been matched by employment growth which has contributed to modest levels of unemployment. The growth in jobs has largely been in the higher productivity services sector. The country's level of education is lower than other countries in the region or at a similar level of income. Compared to these countries, students in Paraguay are reported by the Human Capital Index to achieve almost one year less of learning adjusted years of school. While a fairly large proportion of employers (more than 20 percent) identify an inadequately educated workforce as a major or very severe constraint, this is in line with employers in the rest of the region and other upper middle-income countries (see table 1.4).

1.2 Looking Ahead

Fostering private investment in Paraguay will require public policy action in several areas. Sector analysis in the following chapters reinforces the case for boosting reliable access to the power supply, strengthening property rights over land, establishing the infrastructure needed for a modern economy, and reducing information asymmetries in the agri-business sector. Likewise, regulatory and policy predictability needs to be enhanced, including to safeguard the environment and local communities. Addressing these constraints will generate profitable private investment opportunities, create jobs, and boost inclusive and sustainable economic growth.

2

Sector Selection

2 Sector Selection

The CPSD examines five sectors with the potential to attract private investment if well-defined constraints can be removed: rice, pork, forestry, solar photovoltaic generation, and textiles and apparel (table 2.1). Sector selection criteria included:

1. Potential to attract private capital if constraints are mitigated.
2. Feasibility of removing key constraints in the near term.
3. Potential development impact.

Sector selection is not intended to be exhaustive. The focus of the CPSD is on sectors where an identified constraint to private investment can feasibly be addressed by public policies. The recommended actions to ease the identified constraints are not necessarily sufficient on their own. Rather, these are prioritized in the CPSD as concrete, observable actions to be taken in the near term for meaningful impact. Their ultimate success in creating jobs and investment will require complementary reforms and capacity building extending beyond the next few years.

Expanding power generation, improving the reliability of transmission, and diversifying energy sources would enhance energy security, take pressure off

Table 2.1

Sector selection and relevance for economic development

Sectors	Relevance
Sustainable production of rice	Diversification into new products will reduce export concentration and vulnerabilities. Expansion opportunities for rice are located in lowlands that are not well suited for soybeans or other crops.
Sustainable production of pork	Diversification into new products will reduce export concentration and vulnerabilities. Increasing value addition has potential to create markets and improve farmers' margins.
Forestry (pulp, solid wood and biomass)	Significant potential as subtropical climate and land conditions contribute to productivity among the highest in the world. A large share of land with potential for forestry is currently unexploited.
Solar photovoltaic generation	Substantial investment needed to ensure adequate energy supply in medium term given impact of climate change on hydroelectric power and expected growth in domestic energy demand.
Textiles and apparel	Potential to support export diversification, integration into regional and global value chains, and job generation.

unregulated use of forests, and have positive implications for poverty reduction. If issues with transmission and distribution can be addressed, investing in solar energy could improve access to clean energy for poor households, potentially reducing their vulnerability to energy poverty and environmental hazards. If private investment in solar energy generation can also facilitate electrification of more remote and rural areas, it could also relieve pressure on unregulated use of forests, thereby further supporting the potential for private investment in forestry.

Sustainable expansion and diversification of agricultural production is crucial for reducing poverty, especially in rural areas. In 2022, 33.8 percent of rural residents were living in poverty, compared to 19.5 percent in urban areas. Moreover, households dependent on family agriculture were 1.8 times more likely to be poor than other rural households. Diversifying into pork and rice production could provide new income

opportunities for these vulnerable rural populations. New investments in the forestry sector could also help to create quality jobs in rural areas. Developing the forestry sector could provide formal employment opportunities, potentially reducing the multidimensional poverty rate in rural areas.

Table 2.2

Potential increases in private investment if recommended reforms are adopted, by sector

Potential increase	Methodology/approach	Assumptions
Sustainable production of rice		
US$155 million to US$311 million in investment by 2033	Estimated planted area to 2033, and corresponding capital investment, if a conducive business environment is in place and ESG measures are adopted.	Low and high estimates correspond to expanding current planted area by 50,000 hectares and 100,000 hectares respectively, consistent with achieving the maximum feasible rice output (see appendix A for details).
Sustainable production of pork		
US$41 million to US$163 million in investment by 2030	Estimated finished hogs in 2030, and corresponding capital investment, if a conducive business environment is in place and ESG measures are adopted.	Maximum level of finished hogs by 2030: 2.2 million hogs, up from current level of 745,000 hogs. Low and high estimates correspond to 50% and 200% of increase in investment, consistent with achieving the maximum feasible pork output (see appendix A for details).
Sustainable forestry		
US$192 million to US$242 million in investment by 2030	Estimated costs of planting 100,000 hectares of Eucalyptus trees in the Eastern region. Estimates based on Capex and Opex (including land leasing costs).	100,000 ha of forest plantations (new forests and replanted forests) over the next 5 years. Lower range estimates correspond to dense plantations for pulp projects

(Table continues next page)

Table 2.2

Potential increases in private investment if recommended reforms are adopted, by sector *(continued)*

Potential increase	Methodology/approach	Assumptions
		and higher range estimates correspond to dense plantations for solid wood. Plantations for biomass are in the middle of the range. (See appendix B for details). Total planted area would increase from 200,000 ha to over 300,000 ha.
Solar photovoltaic generation		
US$2.6 billion in investment by 2040	Estimated based on cumulative CAPEX in 1.7 GW solar generation and storage, consistent with ANDE's 2021-2040 Generation Plan.	CAPEX is based on solar generation and storage installation costs in the US, with additional 10% for Paraguay's higher transportation expenses. Technology costs in solar PV are projected to decrease moderately, consistent with the US National Renewable Energy Laboratory. OPEX is not considered (see appendix C for details).
Textiles and apparel		
US$44 million in investment by 2028	To grow existing exports and achieve economies of scale, an export-to-investment elasticity approach was used based on International Trade Center (ITC) estimates of export potential.	Unrealized export potential: US$25 million. Export-to-investment elasticity of 1.76 (see appendix D for details).

3

Sustainable Production of Rice

AT A GLANCE

- Global rice demand in the coming years is expected to be strong. Sustainable rice production is a potentially profitable opportunity for Paraguay's agricultural sector.
- Paraguay is competitive in rice production due to favorable agroecological conditions, including access to clean energy and water.
- Large tracts of land could be suitable for rice production, if supportive environmental policies are put in place.
- Priorities to attract investment include adoption and enforcement of international ESG standards and development of quality seeds adapted to local conditions.

3 Sustainable Production of Rice

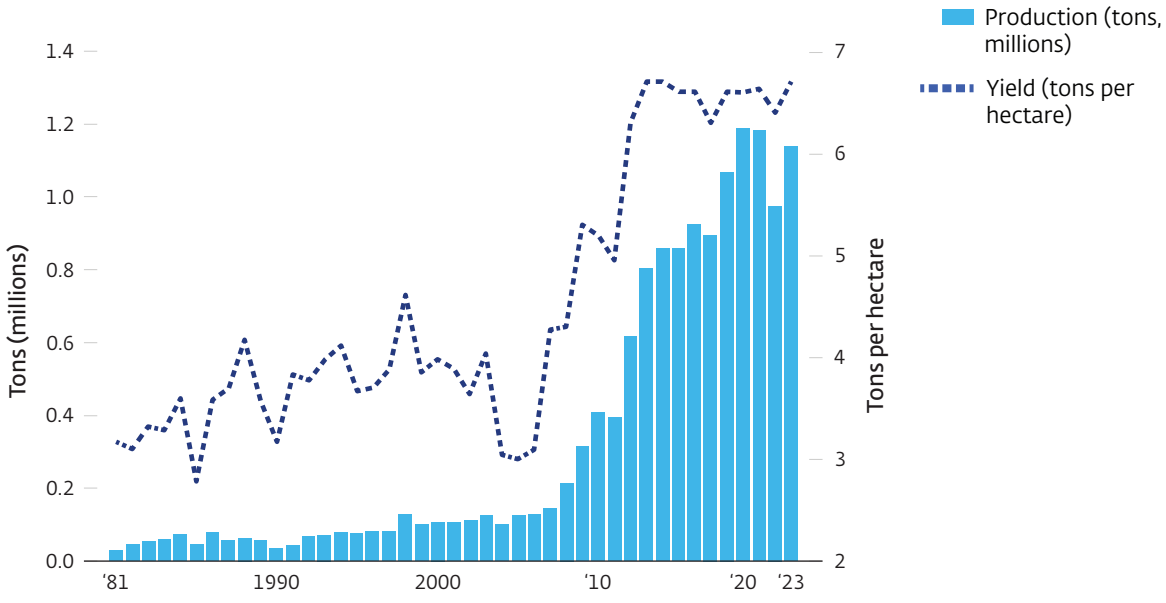
3.1 Sector Context and Opportunity

Rice production is a potentially profitable investment opportunity for Paraguay's agricultural sector. With the right supporting environment, the sustainable production of rice can be attractive to both foreign and domestic private investors. Paraguay's rice exports amounted to 1.2 percent of global rice exports in 2023,[43] and its main regional competitors were Brazil, Argentina and Uruguay. World rice consumption is expected to increase 1.1 percent per year on average up to 2032, according to the 2023 FAO-OECD projection.

Paraguay's rice production levels, yields, and exports have been on the rise. Planted hectares have increased sevenfold since 2000 (figure 3.1). Production increased from 100,000 tons in 2000 to over 1 million tons in 2023. Improved management practices have contributed to higher productivity, raising average yields from about 5 tons/ha in 2010 to more than 6.5 tons/ha in recent years. These yields are close to the yields in Argentina (6.8 tons/ha) and Brazil (6.9 tons/ha), although below Uruguay (9.4 tons/ha).[44] Paraguay's rice exports reached US$415 million in 2023, up from US$63 million in 2010.[45] Brazil remains the primary destination for three-quarters of Paraguay's rice production, but Paraguay has expanded into new markets such as Chile, Guatemala, the United Kingdom, and Costa Rica (figure 3.2).

Figure 3.1

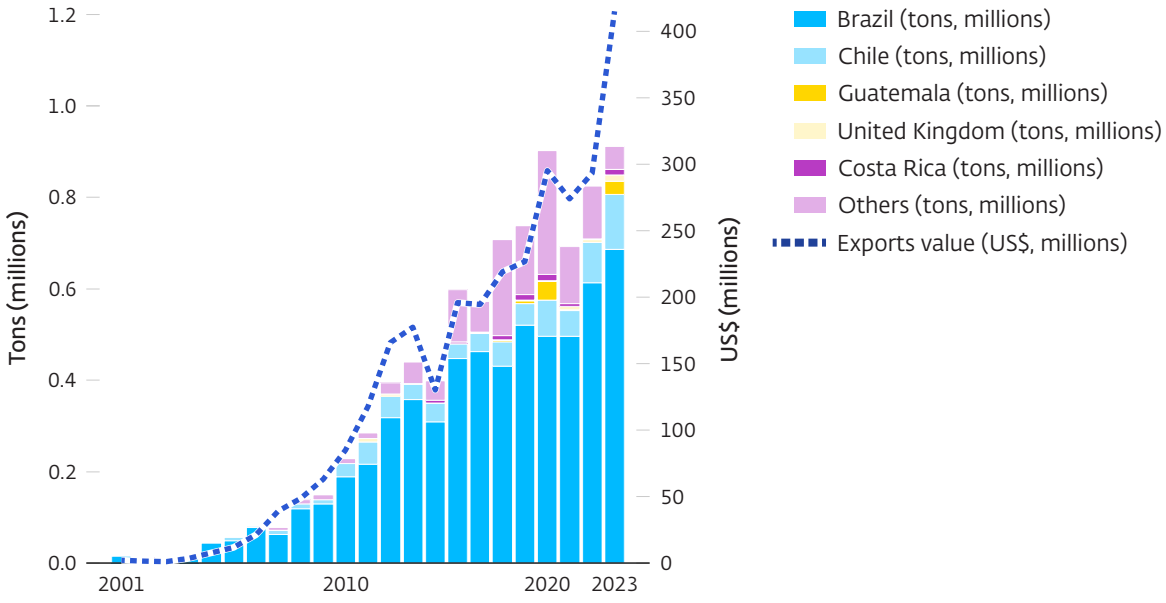
Surging rice production in Paraguay



Source: MAG - USDA data.

Figure 3.2

Most Paraguay rice exports are bound for Brazil



Source: ITC - UN Comtrade data.

Rice production is cost-competitive in Paraguay. Current production costs, excluding transport, are lower than peers in Mercosur due to favorable agroecological conditions, abundant clean energy for pumping water, and access to water resources.[46] As shown in table 3.1, Paraguay benefits from lower irrigation costs, and lower land and labor costs than its peers. Given the flat terrain in Paraguay, the need for, and costs of, operating machinery are also lower. Recent investments in road infrastructure, such as the completed Villeta-Pilar Road, connect lowlands with rice plantations, reducing transportation costs to markets. However, the cost of fertilizers and agrochemicals, which are mostly imported, are higher in Paraguay than in neighboring countries.

Rice production in Paraguay is located in lowlands that are not well suited for soybeans or other crops, which require high, well-drained, structured, permeable soils with high runoff capacity. The departments with the highest rice production levels are Misiones, Ñeembucú, Paraguarí, and Itapúa. Since rice is a crop subject to a permanent flood irrigation regime during the production cycle, it does best in environments with low hydromorphic soils and flat topography that are close to water sources with good flow and in plots ranging from 100 to over 10,000 hectares.

Table 3.1

Rice cost per hectare, 2023 (US$)

Operation expenditures	Argentina	Brazil	Paraguay	Uruguay
Airplane operations	42	54	54	700
Land machinery operations	513	448	364	
Irrigation equipment operation	153	98	50	
Labor	104	65	37	280
Seeds	91	51	60	390
Fertilizers and agrochemicals	383	570	523	
Other expenditures	93	121	84	
Total expenditures	1,379	1,406	1,172	1,370
Land rent	349	334	245	339
Operational cost	1,728	1,740	1,417	1,709

Sources: Brazil: Data from CONAB for Uruguaiana (2023-2024 Campaign); Argentina: PROARROZ (Costs for May 2023); Paraguay: WBG elaboration of 2023 production costs, based on interviews with mid and large-scale farming companies; Uruguay: Revista Arroz, No. 108.

Despite the sector's recent growth, only 20 percent of Paraguay's land suitable for rice production is planted, indicating there is significant potential to expand production.[47] According to interviews with industry experts and local investors, suitable areas are non-cultivated lowlands, currently being used as low-profit cattle farms. This report estimates that, with a conducive business environment and adequate enforcement of environmental regulations, additional investment of over US$300 million could be catalyzed in the next seven to ten years, leading to an additional 100,000 planted hectares (see appendix A for more details).

Rice production requires large upfront investment in infrastructure (land preparation and water irrigation systems), but affordable long-term funding is scarce. Among rice producers, available short-term credit lines for working capital are not appropriate to finance capital expenditures. Rice producers interviewed for this report indicated that approximately half of production is carried out on rented land that does not serve as mortgage collateral required for longer-term loans. Attempts have been made to provide longer-term loans to the agricultural sector leveraging the Paraguayan Development Bank (AFD) through PROCAMPO.[48] Local banks currently lack the appetite to finance rice investments, given ESG risks and the sector's vulnerability to shocks in the Brazilian economy, (due to the concentration of rice exports to Brazil). Addressing and mitigating ESG risks, as discussed in section 3.2 (Constraints and Recommendations to Increase Private Investment in Rice Production), is crucial to harness the potential of rice.

3.2 Constraints and Recommendations to Increase Private Investment in Rice Production

3.2.1 *Access to Quality Seeds and Other Constraints*

CONSTRAINT 1. Lack of access to quality planting seeds and varieties. Producers use so-called "white bag" seeds instead of certified ones, thereby lowering yields and undermining access to potential markets. Because the sector is small and there is a perception that the process of developing seed varieties is long and costly, neither the private sector nor the government have invested in adapting varieties.

RECOMMENDATION 1A. Leverage the Latin American Fund for Irrigated Rice (FLAR) to support the development of new rice seed varieties adapted to Paraguay's soil conditions. The government of Paraguay should restore its FLAR membership, which lapsed in 2022.[49] Restoring FLAR membership would enable Paraguay to join a partnership focused on enhancing the competitiveness and sustainability of rice production systems with an eco-efficiency approach.[50] In the longer term, Paraguay will need to enhance the Paraguayan Institute of Agricultural Technology's (IPTA) technical and

institutional capabilities to support research and development, following the example of the National Institute of Agricultural Research (INIA) in Uruguay.

RECOMMENDATION 1B. The Ministry of Agriculture and Livestock (MAG) through the Directorate of Agricultural Extension (DEAG) should implement targeted extension services for rice producers. Farmer training, dissemination of available financial products, access to quality inputs, and monitoring and evaluation can enhance farming practices.

3.2.2 *Infrastructure Gaps*

CONSTRAINT 2. Infrastructure and logistics gaps hinder rice sector growth.[51] Locations with potential for rice production have fewer paved roads, hurting competitiveness. Road maintenance is inadequate, particularly for rural roads.[52] Public spending on roads has been skewed toward paved roads in national rather than secondary networks.[53] Furthermore, limited electricity distribution to rice production areas hampers the sector's expansion into new regions. Increasing rice exports will increase pressure on trade logistics, competing with larger commodity producers, such as soybeans.

RECOMMENDATION 2. Improve farm access to existing transport infrastructure by building and improving maintenance of secondary roads specifically in the department of Ñeembucú. Road infrastructure in the department of Ñeembucú should continue to be a priority to develop the region's potential in rice. Connecting the municipalities of Villa Franca, Villa Florida, Caapucu, and Villa Oliva to the Villeta-Pilar Road would link producers to markets and should be a priority.

3.2.3 *Reputation Risks Associated with Environmental Regulations*

CONSTRAINT 3. Limited adoption and enforcement of internationally recognized ESG standards and the absence of subnational government plans for sustainable land use are significant barriers to large international investors in rice production, particularly given associated reputational risks. There is no certification system in place for sustainable rice production in Paraguay. Certification is required for potential export markets such as the European Union and the United States. Currently some local producers apply the IFC Health & Safety Guidelines or the ISO 20000 standard, which specifies the requirements that companies in the food industry must meet to ensure safe processes from farm to table. However, there is a substantial gap between these requirements and the standards included in the international Sustainable Rice Platform, the globally accepted certification.[54]

RECOMMENDATION 3A. Adopt and enforce a sustainability certification system such as the Sustainable Rice Platform (SRP) to enable access to markets that require ESG standards. Adoption of international ESG standards is necessary to access many international markets for rice. Paraguay must also build the institutional capacity to credibly enforce such a standard.

RECOMMENDATION 3B. Clearly define rice production areas and enforce sustainability standards for small/medium/big producers. This may require technical assistance to municipalities with more limited institutional capacity from the Vice Ministry of Economic and Planning and a strengthened the Ministry of Environment and Sustainable Development (MADES) to prepare and enforce their land use plans (*plan de ordenamiento urbano y territorial*).

Table 3.2 lists recommendations to remove obstacles to private investment in rice production in Paraguay.

3.3 Risks to Be Managed

There is a need to enhance ESG practices in the rice sector.

Methane emissions from flooded rice are one of the key environmental risks associated with production.[55] Paraguay needs to better track methane emissions from its rice crops, apply the Alternate Wetting and Drying[56] cultivation method to reduce emissions, and use lower-emission varieties that are better adapted to Paraguay's climate and soils.

Rice crops make extensive use of water: Current law establishes fees for the use of water, but it is not being enforced, leading to overuse of water. The absence of incentives to manage water resources in a sustainable manner leads to water waste and social and reputational risks from its impact on other sectors, such as fishing. Paraguay needs to improve enforcement of existing water management legislation by allocating permits and concessions for water use, enforcing a transparent methodology to set water tariffs, and enhancing the capacity of MADES' General Directorate of Water Resources to enforce compliance with the legal framework.

Table 3.2

Priority policy recommendations for increasing private investment in the rice sector

Constraint	Recommended actions
Infrastructure and logistics gaps hinder rice sector growth	Improve farm access to existing transport infrastructure by building and improving maintenance of secondary roads specifically in the department of Ñeembucú.
	Responsible government entities: Ministry of Public Works and Communications (MOPC), in collaboration with the Ñeembucú Governorship and relevant municipalities.
Lack of formal sustainability certification system applied to rice production in Paraguay. **Limited norms for sustainable expansion of rice crops and management of wetlands.**	Adopt a sustainability certification system such as the Sustainable Rice Platform (SRP). Implement land use planning to manage the sustainable expansion of rice production while protecting critical habitats and taking into account hydrological impacts.
	Responsible government entities: MADES / MAG / MIC / Municipalities / IPTA
Limited access to seed varieties.	Facilitate access to new varieties within commercial private sector and research with public institutions. Implement the agreement with the Latin American Fund for Irrigated Rice.
	Responsible government entities: MAG / IPTA / SENAVE

4

Sustainable Production of Pork

AT A GLANCE

- The global pork market is set to grow significantly. Sustainable pork production represents a potentially profitable investment opportunity in Paraguay's agricultural sector.
- Paraguay is already able to competitively transform its grain production into animal feed. By integrating grain (as animal feed) into the meat value chain for pork production, Paraguay can increase value addition in the agriculture sector.
- Realizing opportunities in pork production hinges on adequate management of ESG risks, a "compartment strategy" to address risks from Foot and Mouth Disease, and improved access to long-term finance.

4 Sustainable Production of Pork

4.1 Sector Context and Opportunity

Sustainable pork production represents a potentially profitable, investment opportunity in Paraguay's agricultural sector. With the right supporting environment and policies, pork production can be attractive to both foreign and domestic private investors and contribute to diversification in the agriculture sector.

The global pork market is set to grow significantly. As incomes rise across the globe, demand for protein-rich diets is increasing. According to the OECD and the Food and Agriculture Organization, pork demand is expected to grow 15.7 percent by 2030 relative to 2018–2020, outpacing the projected 5.9 percent growth in beef consumption.

Pork production in Paraguay is nascent but is well-placed to expand. The South-East zone of the Eastern Region has the largest number of pigs in production in the country. The main industrial cluster in the pork sector, accounting for approximately 40 percent of pig slaughter production, is UPISA—Colonias Unidas in Itapúa. It currently has the only meat processing plant authorized by the National Service for Animal Quality and Health (SENACSA) to export frozen pig meat. The construction of a pork meatpacking plant by a Brazilian investor is currently underway.

Expanding pork production can increase value addition in the agriculture sector by transforming grain production into animal feed and integrating it into the meat

value chain. Paraguay is a competitive producer of animal feed,[57] which represents 70–80 percent of pork production costs.[58] Average costs of pork production are similar to those of Brazil's most competitive pork-producing states of Santa Catarina and Mato Grosso (figure 4.1), and lower than competitors including the Netherlands and Denmark.

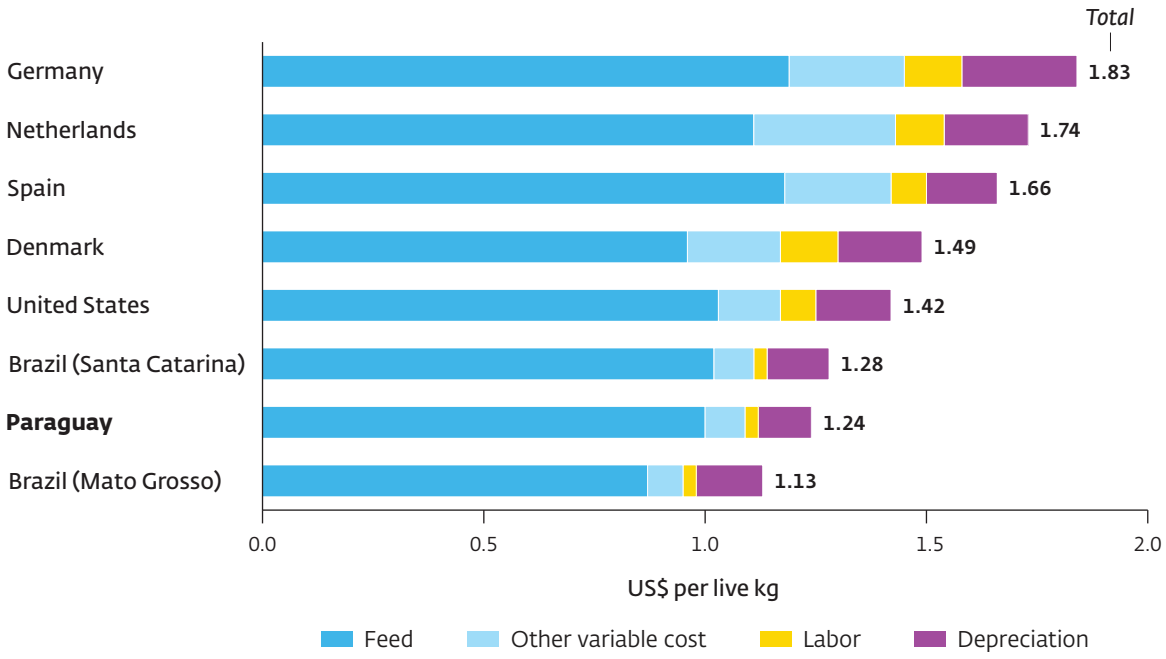
Paraguay's pork exports have been expanding. According to SENACSA, annual slaughtering capacity doubled over the last five years, while the number of slaughtered pigs rose more than 18 percent between 2020 to 2023. Pork exports grew from 6,600 tons (US$13.4 million) in 2020 to 9,500 tons (US$32 million) in 2023 (figure 4.2). Paraguay exports to Uruguay and Taiwan and is currently seeking authorization to export pork to Chile, Korea and Japan.

According to SENACSA and interviews with representatives of the country's meat export industry, Paraguay's pig herd could potentially triple by 2030. Processing capacity grew considerably in the last five years due to investments in the *UPISA*, *Pirayu*, and *Recanate* plants. At the same time, growth in the number of piglet production units was lower than the growth in processing capacity, generating idle processing capacity of

Figure 4.1

Paraguay pork production costs in middle-scale farms are lower than most competitors

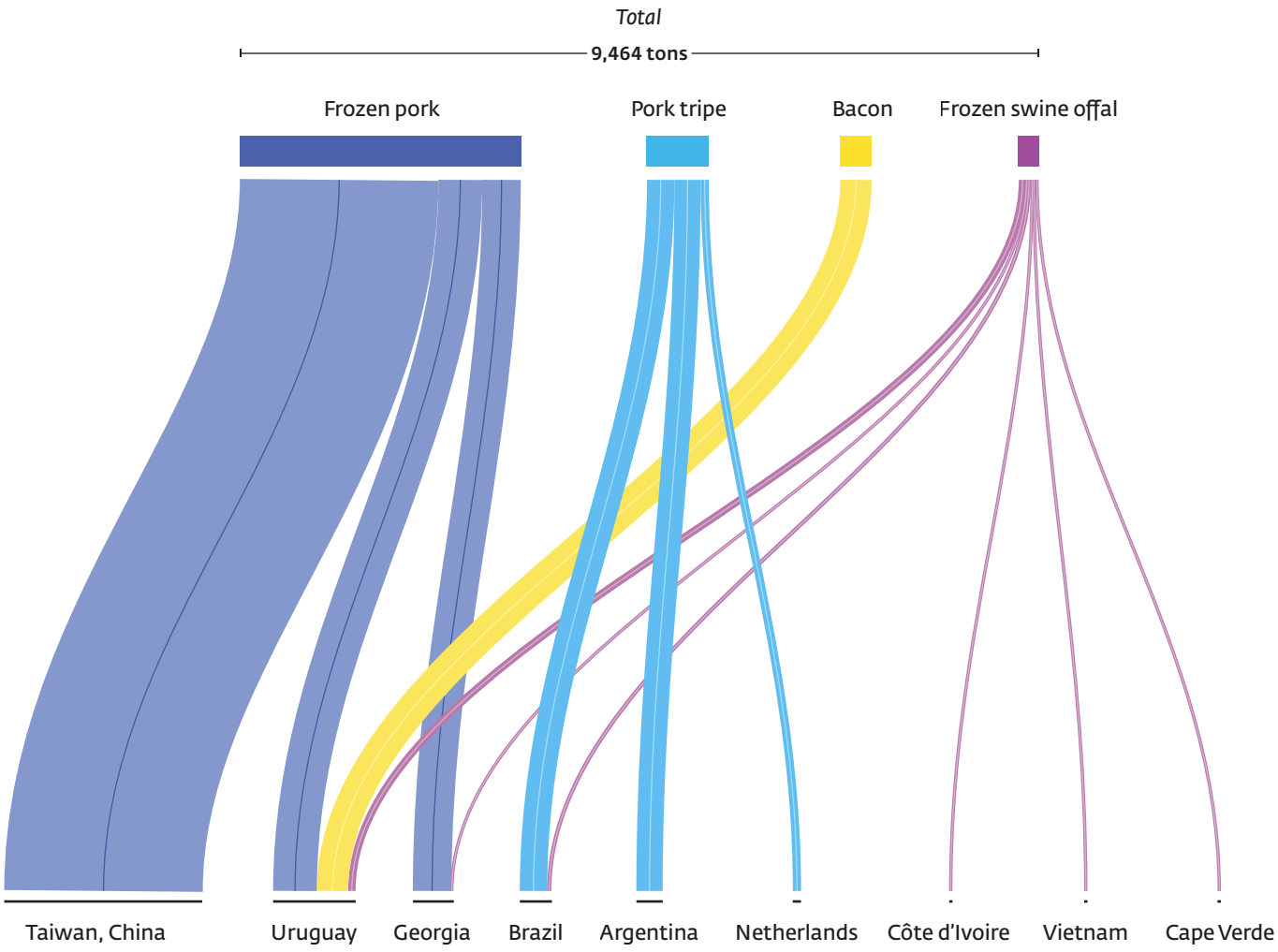
Hog production costs, 2022



Source: World Bank Group estimates based on Interpig data and local costs.

Figure 4.2

Paraguay's 2023 pork exports dominated by Taiwan, China



Source: ITC - UN Comtrade data.

53 percent at the higher levels of the value chain. To fully use this excess capacity, an estimated investment of about US$150 million in piglet production and fattening (animal feed processing) would be needed. This could raise pork exports to approximately US$420 million,[59] up from US$32 million in 2023. Pork exports would add roughly US$360 million to the value-added of exports relative to exporting soybeans and corn, which are the main input for pork feed.[60] A 200 percent increase in finished hogs would generate an estimated 5,200 additional direct jobs by 2030,[61] and approximately 21,000 indirect jobs (see appendix A).

4.2 Constraints and Recommendations to Increase Private Investment in Pork Production

CONSTRAINT 1. Sanitary standards to protect against Foot and Mouth Disease in livestock are inadequate for higher-end markets. Although there is a vaccination program in place to prevent Foot and Mouth Disease in cattle, industrial pig populations are not vaccinated. Certification as "Foot and Mouth Disease-free without vaccination" status (as opposed to the current "free of FMD *with* vaccination") is a necessary requirement for Paraguay to reach premium export markets.[62]

RECOMMENDATION 1. SENACSA needs to speed the implementation of the "compartments strategy."[63] The adoption of a "compartments strategy" is recommended by the World Organization for Animal Health. The compartments allow for the minimization of the risks of introducing, exposing, and disseminating infectious agents for which the compartment is being defined. SENACSA has recently issued regulations for implementing sanitary compartments in the pig sector.

CONSTRAINT 2. The development of the pork value chain requires the expansion of surveillance, monitoring, planning, and certification. Currently, SENACSA's resources are focused primarily on cattle.

RECOMMENDATION 2. SENACSA's technical and institutional capabilities need to be strengthened to achieve world class sanitary and quality standards for the pork sector. This will require investment in labs, technicians, finishing farms and biosecurity measures, along with capacity building of a dedicated team for the pork sector.

CONSTRAINT 3. Limited multimodal infrastructure and logistics hinder pork sector growth. Existing production centers and locations with potential for pork production have few paved roads, raising the cost of reaching markets. Road maintenance is inadequate, particularly in rural areas.[64] The planned Bioceanic Corridor to *Antofagasta* in Chile, expected to be finished by 2025,[65] is a priority because it can significantly reduce transport costs to Asia.[66] The limited number of port facilities equipped to handle refrigerated cargo, especially along the Paraná River, is another constraint.

RECOMMENDATION 3A. In Canindeyú, Alto Paraná, and Itapúa, build more secondary roads linking small and medium farms to processing facilities. Road infrastructure in the department of Canindeyú, specifically in the Katuete District, should be a priority to develop the region's potential in pork. Paving secondary roads in Alto Paraná, specifically in the areas of San Cristobal, Naranjal, and Pindo, as well as in the districts of Obligado and Alto Vera in Itapúa, is also a priority.

RECOMMENDATION 3B. The National Administration of Navigation and Ports (ANNP) should expand and modernize refrigeration capacity at the ports on the Parana River. Upgrading the equipment to handle refrigerated cargo in these ports is crucial for the pork sector.

4.3 Risks to Be Managed

Key risks to be managed to expand pork production include ESG challenges such as methane emissions, management of effluents and solid waste, as well as community rejection of pork production and processing due to odor.

Methane is produced from the decomposition of livestock manure under anaerobic conditions that occur when many animals are confined (e.g., in dairy farms, beef feedlots, and swine and poultry farms). Large producers already have state-of-the-art waste management systems, but most small and medium producers do not.

Pork production requires intensive water use.[67] Effective measures to promote the efficient use of water will be necessary. As noted in chapter 3 on rice production, measures are in place but not enforced.

Odor generation creates resistance in the surrounding communities, exacerbated by the lack of land use planning in most of the country's municipalities.[68] This can be mitigated through MADES' environmental licensing process to promote plant barriers and good management practices. ESG risks can also be better managed by more clearly defining pork production areas and by implementing land use planning at the municipality level.

Table 4.1 lists recommended actions to remove disincentives to private investment in pork production and processing in Paraguay. The recommended actions will require the government to sustain a prudent macro-economic framework, address logistical and financial issues, and enforce ESG standards.

Table 4.1

Priority policy recommendations for increasing private investment in the pork sector

Constraint	Recommended actions
Sanitary standards to protect against Foot and Mouth Disease in livestock are inadequate for higher-end markets.	Speed the implementation of "compartments" project initiated in the UPISA Cluster. The compartments strategy has been advised and recommended by the World Organization for Animal Health.
	Responsible government entity: SENACSA
The growth of the pork value chain requires the expansion of surveillance, monitoring, planning, certification to support the value chain's development.	Strengthen SENACSA's technical and institutional capabilities to meet world class sanitary and quality standards.
	Responsible government entity: SENACSA
Limited multimodal infrastructure and logistics hinder pork sector growth.	Expand secondary road network and improve road maintenance in Canindeyú, Alto Paraná, and Itapúa, to better link small and medium farms to processing facilities.
	Responsible government entity: MOPC
	Expand and modernize refrigeration capacity at the ports on the Parana River.
	Responsible government entity: National Administration of Navigation and Ports (ANNP)

5 Sustainable Forestry

AT A GLANCE

- Commercial plantation forestry is emerging in Paraguay, with a sharp increase in planting and two large investments announcements, including for a pulp mill.
- Paraguay has considerable land suitable for fast-growing commercial-grade plantations.
- Some species, such as eucalyptus, offer attractive returns on investment, but a sustainable approach is needed to preserve the natural ecosystem.
- To attract additional private investment, Paraguay will need an up-to-date and more modern land information system (including cadaster) to facilitate land market transactions, more efficient environmental permitting processes, better control of corruption related to timber transport permits, and faster process for the registration of forests to be used as collateral.

5 Sustainable Forestry

5.1 Context and Opportunity

Growth in commercial plantation forestry in Paraguay has accelerated sharply in recent years. Since 2010, Paraguay's plantation area, which is concentrated in the Eastern region,[69] has quadrupled and planting rates accelerated sharply in 2023 to 50,000 hectares per year,[70] driven by a growing global demand for wood and fiber and two large joint ventures.[71] Paraguay's soil and climatic conditions are ideal for commercial plantation forestry. For example, eucalyptus in Paraguay has a mean annual increment (MAI) of 25–48 cubic meters per hectare per year, similar to Brazil but higher than Chile and Uruguay, with MAIs of 20–24 and 25–28 cubic meters, respectively.[72]

Forestry can create quality jobs. While there are no official employment statistics for the sector in Paraguay, it is estimated that companies created more than 2,000 direct, formal, full-time jobs in 2023. This is equivalent to more than 30 jobs per 1,000 ha, 10 times the employment generated by cattle-raising in the same area. The average monthly salary of a worker in forestry is US$588, which is twice that of a worker in cattle farming.[73] However, similar to pulp investments in the region, access to labor, both high-skilled (forest engineers and managers) and less skilled (welders, for instance) is a key constraint.

Biomass[74] is one of the most important energy sources for Paraguayan households and industry but is largely supplied from native forests. An estimated 71 percent of

forest plantations is destined for biomass (fuelwood and biomass residues) used by industry and households.[75] Households, especially in rural areas, use fuelwood as their energy source for cooking. This reflects, in part, problems with access to electricity in more remote areas. At 77 percent, biomass (both fuelwood and biomass residues) represents the most used energy source by the industrial sector and is primarily used for charcoal processing for export, corn drying, and the biofuel industry.[76] Households and industry consume approximately 13,521,931 cubic meters of biomass per year, 19 percent of which is supplied from plantations and 81 percent from native forests.[77]

To better protect native forests, the government has committed to creating a registry of industrial biomass users and establishing the prerequisites for the use of biomass. Biomass produced from managed native forests can be legal but requires an environmental license issued by the Ministry of Environment and Sustainable Development (MADES) and a forest management plan approved by the National Forest Institute (INFONA). Most deforestation in the Western Region in the years 2020–2021 and 2021–2022 happened through land use change plans (PUT) authorized by INFONA, with 79.3 percent and 76.7 percent of total deforestation in that region each period, respectively.[78] The government has committed to establishing an industrial biomass user registry, biomass certification (as part of a National Biomass program) through Decree 1788/2024,[79] and joint intervention protocols by INFONA, MADES the National Police, and the National Anti-Drug Secretariat (SENAD) on land use change based on the National Forest Monitoring System, established by Decree 1746 in May 2024. Although the regulations are now in place, the certification program and registry are not yet operational.

International buyers and brands increasingly demand sustainability certification when sourcing materials. While it is possible to export charcoal to the US and EU without sustainability certification, there is a strong consumer preference in both markets for sustainably sourced products. For example, the EU deforestation regulation (EUDR) ensures that seven commodity products that are major drivers of deforestation will no longer be sold in the EU if sourced from areas affected by deforestation or forest degradation practices.[80] In Paraguay, the most commonly used internationally recognized sustainability certification process is from the Forest Stewardship Council (FSC).[81] About 37 percent of Paraguayan companies have FSC certification.[82]

5.1.1 *Forestry Value Chain*

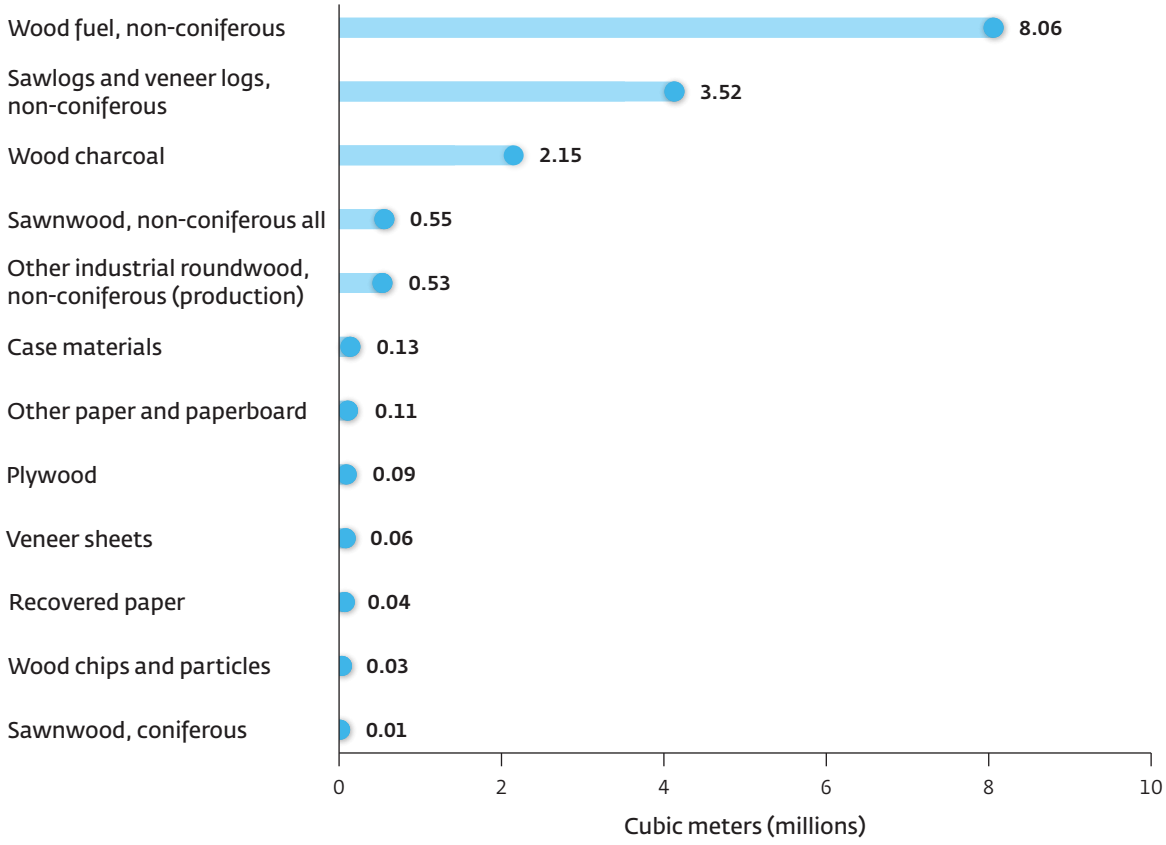
In Paraguay, the forestry value chain begins with primary wood production from native forests and commercial plantations. Industrial roundwood is then used for primary and secondary wood transformation. Raw roundwood from primary wood production and industrial residues from primary wood transformation are used by the biomass industry. According to a wood industry census carried out by INFONA in 2022, there are 424 industrial companies including sawmill, chipping, laminating, veneer, turning,

parquet and multilayer industries. The initial stages of industrial activities are carried out by sawmills, which represent 67 percent—the largest share—of companies in the census. This is followed by the chipping industry, 25 percent of industries, which is specialized in the production of biomass chips. Biomass wood chips are used by industries with automated processes and high production volumes, such as oil mills. Other users, including grain dryers, meat processing plants, dairy producers, and brick factories, use fuelwood. Also in the value chain are companies that offer plantation services and maintenance, and those that carry out their own plantations and subsequent marketing.

Almost two-thirds of Paraguay's wood production is biomass (e.g., fuelwood and charcoal). Much of the remainder is industrial roundwood that can be transformed into basic wood products.[83] Figure 5.1 provides a breakdown of Paraguay's wood production. A significant portion of charcoal is exported.

Figure 5.1

Biomass (fuelwood and charcoal) dominates wood production in Paraguay, 2023



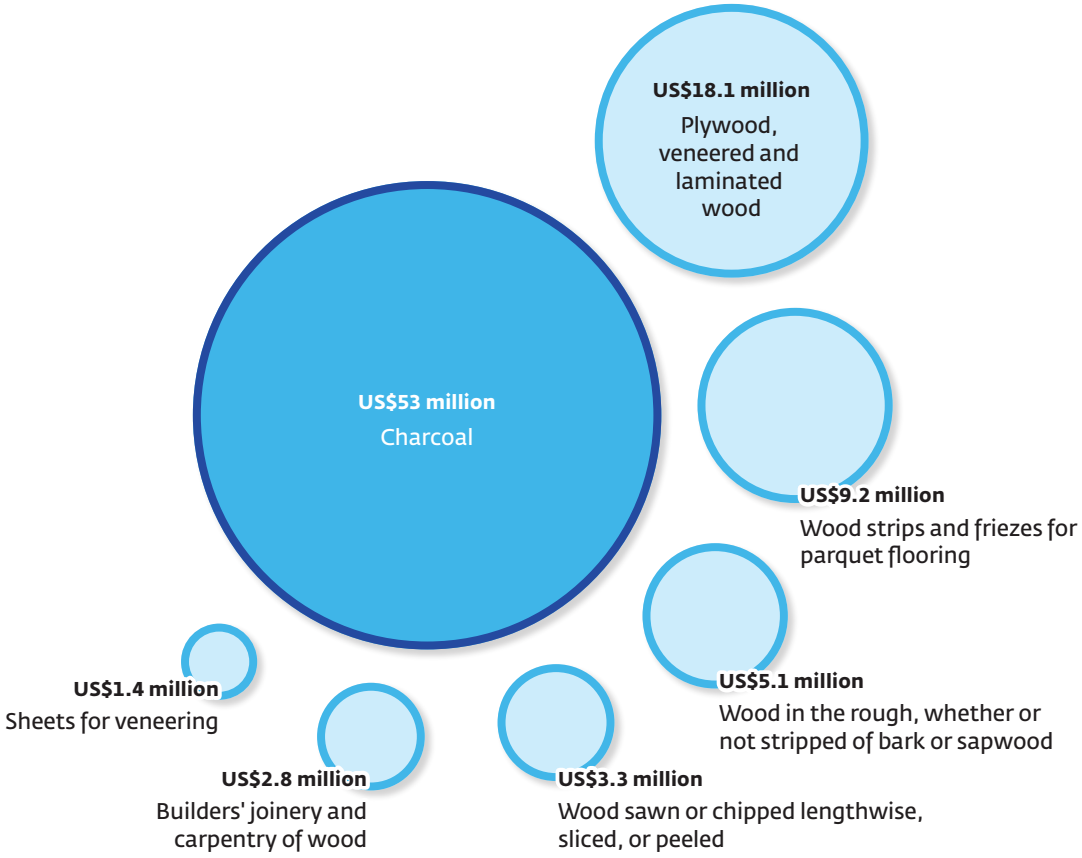
Source: FAOStat.

Paraguay's wood exports are concentrated in lower value-added products. In 2023, Paraguay exported US$53 million in charcoal, representing 56 percent of total wood exports from Paraguay (figure 5.2). The export of plywood, veneered, and laminated wood accounted for 19 percent in volume, with a value of US$18 million. Eighty-seven percent of Paraguay's veneer sheet exports went to Brazil and the primary importers of Paraguay's plywood were the US (33 percent) and the UK (27 percent), followed by Chile (11 percent), Italy (8 percent), Uruguay (7 percent) and Argentina (6 percent).

Paraguay's Eastern region has about five million hectares of land that could be used as fast-growing commercial-grade plantations.[84] Commercial Forest plantations occupy 205,000 hectares of land. If natural habitats are protected, this could be expanded to five million hectares. By comparison, Uruguay, whose overall land size is less than half of Paraguay's, had one million hectares of forest plantation in 2023. The development of forest plantations in Uruguay was driven, in part, by the Botnia-Fray Bentos pulp mill investment in 2007.

Figure 5.2

Low value-added wood exports, 2023



Source: International Trade Center Trademap.

Internal freight costs represent approximately 50 percent of total costs of production. As a landlocked country, Paraguay faces higher logistics costs. Low water levels and lack of dredging result in waterways above Asuncion not being navigable year-round. Low water levels also mean that barges need to be loaded below capacity or that companies need to move goods by truck, raising costs.

Paraguay's first pulp mill investment, an estimated investment of US$4 billion, is the country's largest private investment announced to date. As of May 2024, 108,443 hectares of eucalyptus had been planted. This investment could help formalize domestic wood product markets and create more value addition.[85] It also has the potential to be transformative for the sector, in the same way pulp mill investments were for Uruguay and Chile over the last 20 to 45 years. A pulp mill producing approximately 1.8 million tons per year would lead to exports of approximately US$1 billion per year.[86] Other private initiatives are also implementing large-scale tree planting projects, with ambitious goals to reforest substantial areas of land.

Affordable long-term funding for the forestry sector in Paraguay is scarce. In countries with more developed forestry markets, like Brazil and Chile, large companies—typically in the pulp and paper segment—are financed through a mix of equity financing from parent companies, debt issued in domestic or international markets, and bank loans. Access to international and long-term financing for forestry ventures in Paraguay has only recently emerged. FDI in forestry is still incipient in Paraguay, with two joint ventures driving recent capital mobilization. Investors jointly raised US$325.3 million in April 2024 for the Silvipar-Astarte Impact Forestry Fund. Local banks grant loans to the sector under a product called *Proforestal*,[87] offered by the Paraguayan Development Bank (AFD).[88] According to AFD, demand for *Proforestal* will continue to surge, with credits possibly doubling from 2023 to 2025. The demand is expected to come from various project developers and subcontractors.

New forest-based investments in Paraguay can be profitable. Analysis carried out for this CPSD on the profitability of biomass, solid wood and wood production for pulp log investment projects suggests attractive returns can be achieved. A solid wood production project could have an Internal Rate of Return (IRR) of 16 percent. Biomass and wood destined for pulp logs could have an IRR of 13 percent (after two rotations).

5.2 Constraints and Recommendations to Increase Private Investment in Forestry

CONSTRAINT 1. Paraguay's framework for land market transactions and tenure security as well as land use planning and enforcement is not supportive of

investment in new plantations. The land administration system faces difficulties, including incomplete and unreliable cadaster, registry, titling and other processes. These affect land transactions, access to credit (via collateral) and tenure security stemming from competing land claims or illegal occupancy. Delays in land titling, particularly regarding cadastral maps, discourage investors. There is no complete cadastral cartography with municipal boundaries and clear urban perimeters. There are also redundancies, information asymmetries and low institutional capacity in land administration (including with respect to land valuation, land use planning, land titling/tenure and land development).[89] On January 9, 2025, the government enacted Law No. 7424, which creates the Unified National Registry and Cadaster System and the Unified National Registry (RUN) and aims to unify the national cadaster and registry under a new centralized system. This law is designed to enhance tenure security, streamline transactions, and reduce costs and processing times. However, these changes will not take effect until the new law and system are fully operational.

RECOMMENDATION 1. To modernize the land information system (including the cadaster) and promote access to productive land, Paraguay needs to:

a. Set up a computerized information system for exchanging cadastral and registry data and make it accessible to everyone involved in land management.

b. Establish standards through the National Statistics Institute for the elaboration of cadastral maps by surveyors, consistent with international good practice.

c. Update cadastral information for areas with high potential for forestry investments as identified by INFONA. This will require: (i) strengthening the geodetic network for positioning and georeferencing services; (ii) the production of cadastral cartography at the national level; (iii) determining municipal boundaries and urban perimeters in prioritized municipalities; and (iv) conducting cadastral sweeps to establish a complete and unified cadastral cartography.

CONSTRAINT 2. The environmental licensing process for forestry investment projects is cumbersome and time-consuming. To get a license, forestry projects must undertake the Environment and Social Impact Assessment (ESIA) using terms of reference (TORs) dictated by MADES and establish a plan to manage environmental impacts. However, this assessment does not comply with the standards required by many export markets. As a result, applicants may have to undertake additional studies, which delays getting a license.

Article 10 of the Environmental Impact Assessment law (294/93) states that if MADES does not issue a license within 90 days, it is considered approved. In practice, the process takes much longer, according to interviews with the private sector.

RECOMMENDATION 2. Revise ESIA TORs to meet international standards. Revise the ESIA TORs to include the following: the assessment of cumulative impacts and associated facilities, alternative analysis, assessment of climate change impacts and risks as well as social impacts and risks. There should also be more clarity on specific standards, such as for water quality and pollution. Digitization could help MADES shorten approval times and enhance communication with private investors.

CONSTRAINT 3. The Sustainable Finance Roundtable, which represents the financial sector in Paraguay, attributes the lack of financing for the sector to the need for collateral. In 2013, authorities passed Law 4890 "Real Right of Forest Surface" to allow the use of forests as collateral.[90] A directive of the Central Bank was issued in 2020 providing guidance on using forests as loan collateral. However, there are still delays in registering forests to be used as collateral.

RECOMMENDATION 3. Given the delays in the registration of forest collateral, both the National Land Registry Service and the Public Records Directorate should introduce a single window for forest surface rights-related procedures.

CONSTRAINT 4. The system for granting and controlling transit permits for forest products, which is essential for the effectiveness of Forest Stewardship Council (FSC) and other certifications, is unreliable and prone to corruption.[91] In Paraguay, forest products require timber transit permits (*guias forestales*) to be transported or exported. These permits are essential for certification and support legal compliance, environmental sustainability, consumer trust, and market access, making them a vital aspect of responsible supply chains. But efforts to use the permits to make timber more traceable have been delayed and face implementation obstacles.[92]

RECOMMENDATION 4. To improve the permitting system, INFONA should work with other institutions to prevent illegal uses of transport permits. These institutions include the National Police, the Highway Patrol (*Patrulla Caminera*), the Ministry for Agriculture and Livestock, the Ministry for Public Works (in charge of weighing trucks on the roads), and Customs. INFONA should also explore a public-private partnership for traceability of forest products, similar to initiatives that were successful in the cattle industry in Paraguay.

CONSTRAINT 5. A national biomass program and registry for producers is needed to ensure sustainable biomass production. In May 2024, the president established a certification regime for the use of bioenergy from forest plantations. However, the start of the certification regime was postponed to 2026, at which point 30 percent of consumed biomass is to be certified. Fifty percent is to be certified by 2027, 70 percent by 2028, 90 percent by 2029 and 100 percent by 2030.

In Paraguay, one of the main obstacles the private sector faces in the FSC certification process is the cost of providing additional public services. In many cases, companies in rural areas must provide services such as health, education, housing, energy or water and sanitation found to be lacking. That drives up the costs needed to comply with FSC principles. FSC certification is also an important consideration for banks when appraising potential loans.

RECOMMENDATION 5. Put in place industry-accepted standards and traceability to facilitate market entry, enable financing and ensure sustainability practices.[93] Specifically, implement the National Biomass Certification Program in accordance with the milestones included in Decree no. 1788/2024 and consistent with internationally recognized certification programs such as the Sustainable Biomass Program (SBP). This is in line with the government's commitments under the Resilience and Sustainability Facility (RSF) with the International Monetary Fund (IMF).

5.3 Risks to be Managed

A sustainable approach to commercial forestry is necessary for the preservation of Paraguay's natural ecosystems. From 2001 to 2023, Paraguay lost seven million hectares of tree cover, equivalent to a 29 percent decrease, and 1.8 Gigatons of CO2 emissions.[94] Cattle ranching and soy production have driven large-scale land use change.

The regulations on deforestation differ for the Western and Eastern regions. Only the Eastern Region is subject to the Zero Deforestation Law.[95] The deforestation law has been effective in reducing deforestation rates in the eastern region, but between 2020 and 2022, it still experienced a 12 percent loss of native forest, caused by subsistence agriculture, illicit crop production and fuel wood extraction.[96] In the same period, the Western region lost more than 361,000 hectares of native forest, most of which occurred legally (within Land Use Plans (PUTs) approved under current regulation) to create space for soybean plantations and cattle ranches.

Table 5.1

Priority policy recommendations for increasing private investment in sustainable forestry

Constraint	Recommended actions
The framework for land market transactions and tenure security as well as land use planning and enforcement is not supportive of investment in new plantations.	Set up a computerized information system for the exchange of cadastral and registry data and make it accessible to everyone involved in land transactions. Establish standards through the National Statistics Institute for the elaboration of cadastral maps by surveyors, consistent with international good practice. Update, expand and maintain cadastral and registry information for areas with high potential for forestry investments, as identified by INFONA.
	Responsible government entities: National Cadaster Service, Ministry of Economy and Finance, General Directorate for Public Registry, Supreme Court, National Institute for Rural and Land Development (INDERT), INE, Municipalities, MADES
The environmental licensing process for forestry investment projects is cumbersome and time consuming.	Revise Terms of Reference for Environment and Social Impact Assessments to meet international standards, such as the assessment of cumulative impacts and associated facilities, assessment of climate change impacts and risks, and social impacts and risks, and require more clarity on specific standards such as for water quality and pollution.
	Responsible government entity: MADES
There are delays in registering forests to be used as collateral.	Introduce a Single Window for forest surface rights-related procedures.
	Responsible government entities: National Land Registry Service, Public Records Directorate
The system for granting transit permits for forest products is unreliable and prone to corruption.	INFONA should work with other institutions to control illegal uses of transport permits. INFONA should explore public-private partnerships for traceability of forest products, which has been done successfully for cattle traceability (i.e., SITRAP).
	Responsible government entities: INFONA, National Police, Highway Patrol (Patrulla Caminera), Ministry for Agriculture and Livestock, Ministry for Public Works, Customs Administration

(Table continues next page)

Table 5.1

Priority policy recommendations for increasing private investment in sustainable forestry *(continued)*

Constraint	Recommended actions
A national biomass program and registry for producers is needed to ensure sustainable biomass production.	Implement a national biomass certification program in accordance with the milestones included in Decree no. 1788/2024 and consistent with internationally recognized certification programs such as the Sustainable Biomass Program (SBP). Put in place industry-accepted standards and traceability to facilitate financing and ensure sustainability practices.
	Responsible government entities: Vice-Ministry for Mines and Energy (VMME), INFONA, Ministry of Industry and Commerce

6

Solar Photovoltaic Generation

AT A GLANCE

- Opportunities for private investment in solar energy are driven by Paraguay's high solar potential, growing domestic energy demand, and government support for energy diversification.
- Unlocking private investment in solar energy generation will require confronting underinvestment in the energy grid to improv reliability of access, addressing ANDE's uncertain financial situation, and updating the regulatory framework.
- Private sector participation will require a purchase mechanism that ensures long term economic viability of the sector and a regulatory and institutional framework that reduces uncertainty regarding grid access.

6 Solar Photovoltaic Generation

6.1 Sector Context and Opportunity

If challenges with transmission and distribution can be addressed, there are potentially profitable opportunities for private investment in solar PV generation. Paraguay produces abundant hydropower, exporting 58 percent of the energy it generates.[97] But domestic energy demand is expected to grow, and the country is vulnerable to climate change, which could reduce rainfall and limit the amount of electricity available from hydropower.[98] Expanding generation capacity and taking advantage of the country's solar potential could help meet projected demand in a sustainable way. This potential is based on high solar irradiance throughout the year, averaging 4.5 to 5.5 kWh per square meter per day,[99] and sufficient land available for solar farms. Paraguay, as a result, has a high solar potential (between 1,400 to 1,800 kWh/kWp per year).[100]

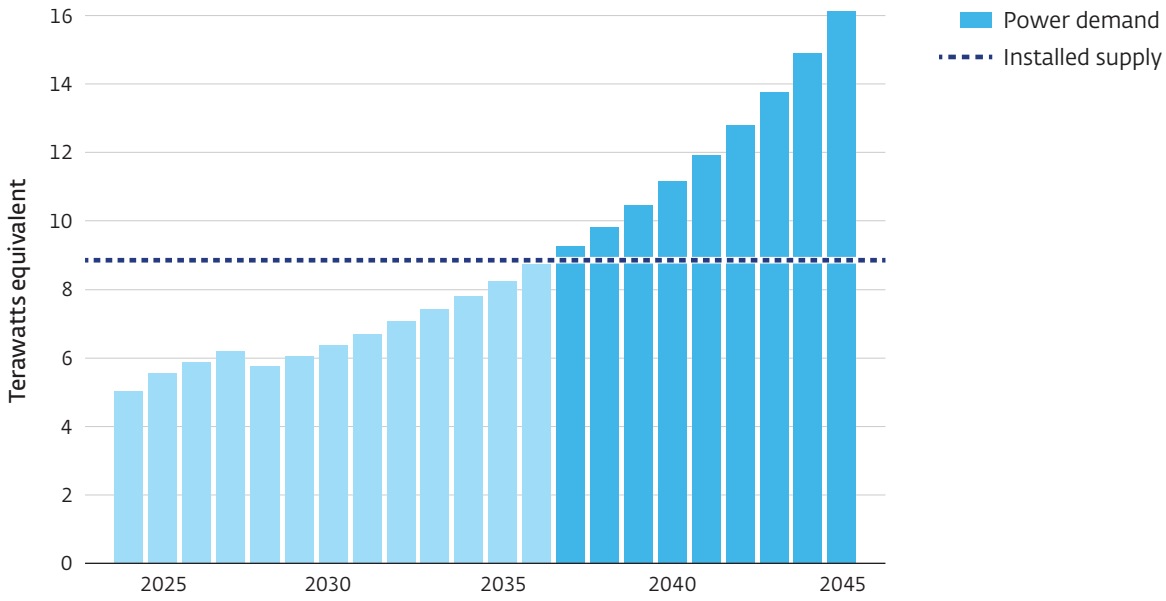
Paraguay's electricity production is concentrated on hydroelectric plants relying on the Paraná River. Three hydraulic power plants, *Itaipú*, *Yacyretá* and *Acaray,* meet much of the country's domestic electricity demand, together able to generate 8.76 MW of energy. The largest is *Itaipú*, built jointly with *Electrobras* on the border with Brazil, with ownership shared equally between the two countries and managed through a binational agreement which assigns half of total production to Paraguay.

Domestic energy demand has been growing steadily and is expected to surpass generation capacity in the 2030s (figure 6.1).[101] Installed capacity has remained constant, however, resulting in declining electricity exports in recent years.[102] The surge in electricity demand during peak hours is already stressing the system, overburdening existing transmission lines and causing frequent interruptions.[103] ANDE, which is in charge of planning and development of infrastructure assets, has announced plans to increase installed capacity in both hydro and solar by 47 percent to meet growing electricity demand, at an estimated cost of US$3.2 billion. IFC estimates that an investment of US$2.5 billion would be needed to bring 1.7 GW of solar generation and storage onto the grid by 2040.[104]

The expansion of Paraguay's grid is essential to maintain service quality, increase coverage into the Eastern Region, and support potential industrial demand. ANDE's Master Transmission Plan 2021–2030 estimates that expansion needed to meet 2030 demand will cost US$3 billion.[105] An additional US$2.1 billion will be needed to expand distribution. Consumer energy tariffs have been insufficient to allow for investment in the grid (figure 6.2), and ANDE's revenue is also constrained by energy losses: In 2023, these reached 28.5 percent of total energy transmitted (23.4 percent in distribution and 5.1 percent in transmission),[106] among the highest in Latin America. Non-technical

Figure 6.1

Power demand will exceed supply by 2037

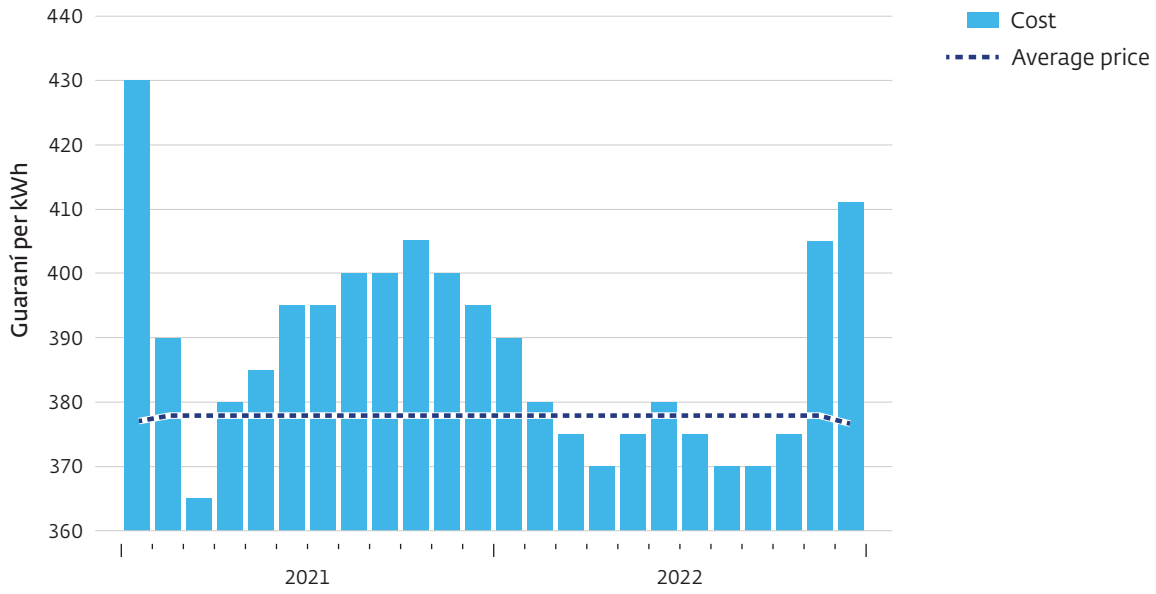


Source: World Bank staff simulations based on ANDE's (2021) Generation Plan.
Note: Power demand is projected to grow at the annual rate (4.4 percent) observed in the last three years for which data are available (2021-2023).

Figure 6.2

Electricity rates don't cover costs

Average cost of generation vs. average price of electricity, 2021–23



Source: ANDE (2023).

(commercial) losses caused by theft, meter tampering, collusion with utility staff, and other sources account for the largest share of losses, about two-thirds in 2023. Increasing energy tariffs to cover costs and necessary investments has been politically difficult. The last increase, in 2017, was the first in 12 years and raised prices 20 percent, well below ANDE's proposed 70 percent. Inflation has averaged 4.5 percent a year since 2017.

6.2 Constraints and Recommendations to Increase Private Investment in Solar PV Generation

CONSTRAINT 1. Energy generated through solar PV projects is currently more expensive than existing hydroelectric generation costs. The levelized cost of energy (LCOE)[107] for a solar PV plant is the minimum price at which energy must be sold for the solar PV project to break even and recover its capital,[108] operational and maintenance costs over a 20-year period). In Paraguay, the solar PV plant LCOE ranged between US$53.7 and US$58.6 per MWh in 2024, which is mid-range compared to international benchmarks.[109] However, this is higher than the US$29.2 per MWh price ANDE pays for electricity from the *Itaipu* hydroelectric plant, which is the statutory benchmark for the

maximum price ANDE can pay for energy. While the new procurement law allows ANDE to consider environmental, economic, and social sustainability benefits when purchasing energy,[110] it is unclear how ANDE could apply these criteria and add them to the price it pays for energy. This uncertainty affects how the reference price for ANDE's additional energy purchases will be determined. Even if this benchmark is adjusted to consider environmental and social sustainability impacts, the price gap remains large. To ensure the economic viability of new energy sources, the purchase mechanism should reflect the long-term opportunity cost of energy in Paraguay; notably, it should include the costs of importing renewable energy or using locally installed thermal power once existing renewable energy capacity is insufficient to meet demand.

RECOMMENDATION 1. Further regulations of the Non-Conventional Renewable Energy Law 6977/2023 should ensure the economic feasibility of long-term Power Purchase Agreements (PPAs) between ANDE and private investors. This would require that the purchase price for energy by ANDE be negotiated in a way that considers the costs of production and the associated costs of investment, allowing investors to recover their costs. It would also require that the price ANDE pays be determined competitively rather than having ANDE be legally bound to the price associated with the lowest cost hydro producer (*Itaipu*). In the medium term, an independent regulator will be needed to design, implement, and oversee transaction rules, prevent conflicts of interest, and monitor pricing rules in PPAs with ANDE as offtaker.

CONSTRAINT 2. ANDE's weak financial position and limited capacity to execute expansion plans have resulted in inadequate investment and constrained transmission capacity. ANDE lacks budgetary autonomy and is significantly dependent on government funding, given that tariffs are insufficient to cover investment costs. Currently, grid expansion is financed mainly through public debt, as ANDE is unable to access credit without sovereign guarantees. In 2022, ANDE invested close to US$350 million, a historic high but short of the US$750 million per year required in its own generation, transmission, and distribution Expansion Plans.[111]

RECOMMENDATION 2. Permit private investment in the energy grid to allow for PPPs initiated by the private sector, while keeping the government as the sole operator. Allowing the private sector to invest in upgrading grid infrastructure can improve quality of service, enable capacity expansion, foster diversification and support other energy intensive industries. The private sector's role can be limited to design, construction, maintenance, and finance with ANDE keeping ownership of the asset.

CONSTRAINT 3. The regulatory framework lacks clear rules on grid access and consistent guidelines for licensing. The methodology used by the VMME to determine

the transmission price charged to new, private generators is not transparent and subject to political interference, which creates an uncertain environment for investors.

RECOMMENDATION 3. Specify the conditions for private investors to access the grid. This should include, for example, the date of commencement and termination of the obligation, rules for dispatch, obligations to build, the point of injection of energy, and the use of guarantees. This will clarify the bankability and stability of revenue streams for the lifespan of a renewable energy generation project, de-risk access to the grid, and assign construction and operational risk among ANDE and private investors.

CONSTRAINT 4. There is uncertainty about ANDE as an offtaker due to its financial fragility. As the sole authorized buyer of energy in Paraguay, confidence in ANDE's financial sustainability is critical for potential private investors in solar PV generation. However, ANDE's financial credibility as a counterparty is uncertain, particularly if it is unable to raise rates charged to consumers.

RECOMMENDATION 4A. Conduct and publish an independent technical audit of ANDE's finances to assess operational efficiency and investment potential. This is in line with the IMF's recommendation under the Resilience and Sustainability Facility (RSF).

RECOMMENDATION 4B. Allow private solar generators to sell directly to end users at a freely negotiated price. This would allow private investors to avoid the constraints, in terms of price and uncertainty, that result from having ANDE as the only offtaker. It would require ANDE to guarantee access to its networks and develop a transparent mechanism to determine transmission tolls. Institutionally, ensuring these conditions are met would also require a regulator.

Table 6.1

Priority policy recommendations for increasing private investment in renewable energy

Constraint	Recommended actions
Energy generated through solar PV projects is currently more expensive than existing hydroelectric generation costs.	Establish regulations under the Non-Conventional Renewable Energy Law to ensure the economic feasibility of long-term Power Purchase Agreements (PPAs) between ANDE and private investors.
	Responsible government entities: Vice Ministry of Mines and Energy
ANDE's weak financial position and limited capacity to execute expansion plans have resulted in inadequate investment and constrained transmission capacity.	Permit private investment in the energy grid, allowing for PPPs initiated by the private sector, while keeping the government as the sole operator.
	Responsible government entities: Vice Ministry of Mines and Energy
The regulatory framework lacks clear rules on grid access and consistent guidelines for licensing.	Specify the conditions for private investors to access the grid. This should include, for example, the date of commencement and termination of the obligation, rules for dispatch, obligations to build, the point of injection of energy, and the use of guarantees.
	Responsible government entities: ANDE, Vice Ministry of Mines and Energy
There is uncertainty about ANDE as an offtaker due to its financial fragility.	Conduct and publish an independent technical audit of ANDE's finances to assess operational efficiency and investment potential. Allow private solar generators to sell directly to end users at a freely negotiated price.
	Responsible government entities: Vice Ministry of Mines and Energy

7

Textiles and Apparel

AT A GLANCE

- Paraguay's textiles and apparel sector has the potential to expand into higher-skilled jobs, many for female workers, to supply the growing global fast fashion value chain.
- Insufficient skills and training to meet buyer's demands, insufficient use of factoring, poor transportation infrastructure, weaknesses in customs administration, inefficiencies in digital trading systems and lack of access to capital, hinder this opportunity.
- Support for compliance certifications of ateliers, expanding the uptake of factoring, streamlining trade and customs regulations, upgrading of skills, and improving access to working capital are needed to remove disincentives to private investment.

7 Textiles and Apparel

7.1 Sector Context and Opportunity

The textiles and apparel sector offers an investment opportunity for industry growth into higher skilled jobs, especially for female workers to supply the growing global fast fashion value chain. The sector benefits from a tax regime which advantages foreign companies that import intermediate goods into Paraguay duty-free before processing and re-export. This tax advantage is complemented by MERCOSUR benefits that provide preferential rules regarding origin: if a product is composed of at least 40 percent regional content, it can be re-exported to any Mercosur country tax-free.[112]

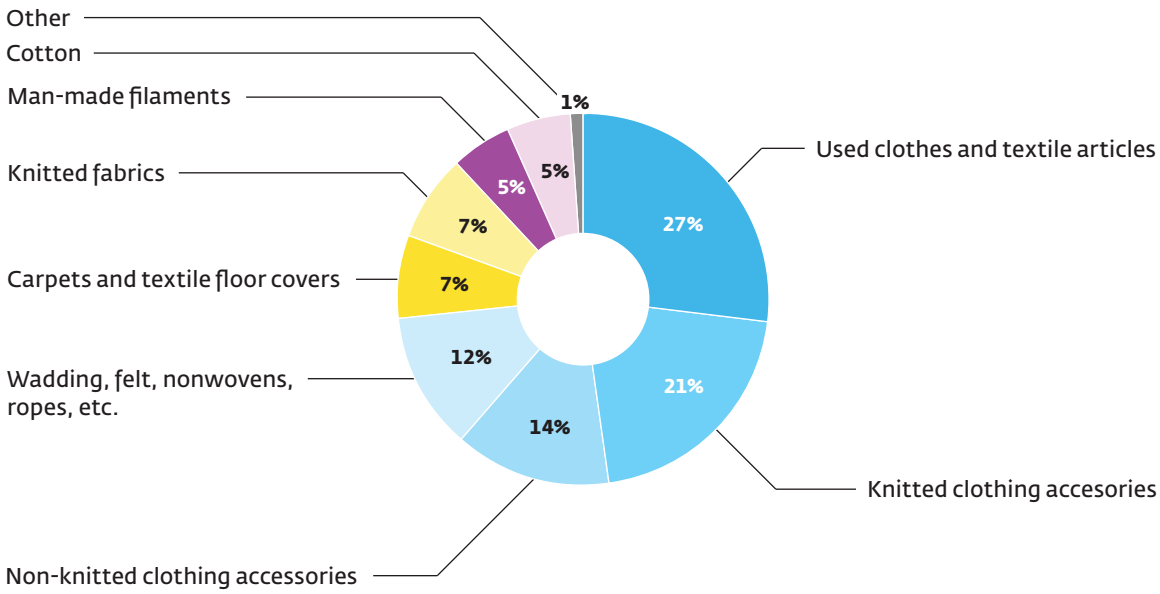
Despite its current small contribution to GDP, the sector has important job creation effects, especially for women. In 2022, it accounted for 1 percent of Paraguay's GDP and 3 percent of exports, employing about 0.2 percent of the labor force (of which 45 percent were women).[113] Between 2001 and 2020, total investment in the industry reached about US$126 million, mostly from Brazil and from within Paraguay. Exports included textiles, clothing accessories and knitted fabrics (figure 7.1). Most of the companies are located in downstream segments of the value chain (figure 7.2).

The global textiles and apparel market is projected to expand following the pandemic-related downturn, growing to US$3.3 billion by 2031 from US$1.8 billion in 2023.[114] Growth of the global market is being driven by sustainability, fast fashion,

Figure 7.1

Paraguay's exports of textiles and apparel, 2022

% share of textiles/apparel



Source: Observatory of Economic Complexity.

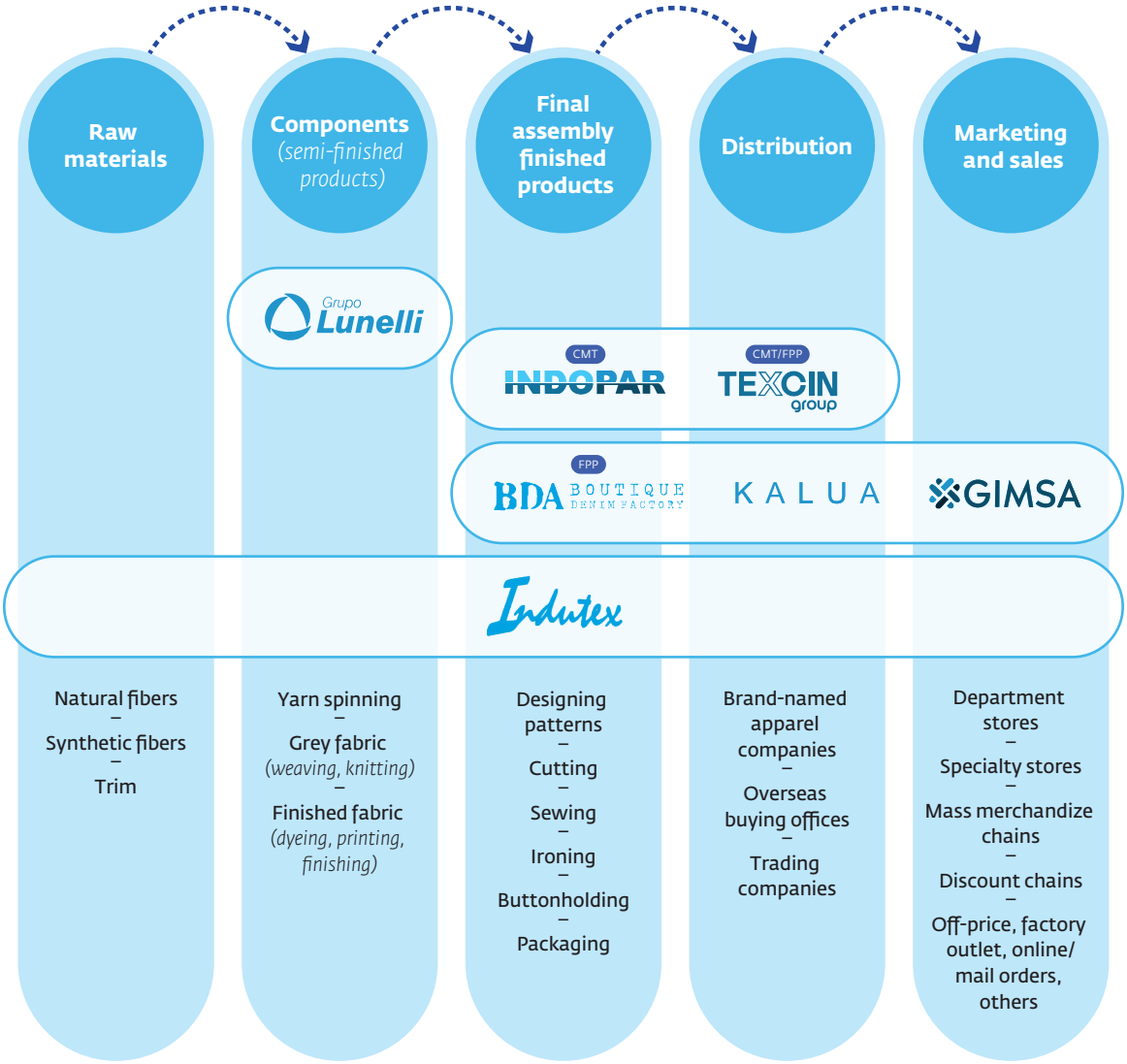
personalization and e-commerce. Fast fashion revenue is expected to grow at a CAGR of 14 percent between 2024 and 2030.[115] At the same time, fast fashion is facing criticism related to sustainability concerns and labor conditions. This creates opportunities for more ESG-compliant fast fashion, and more prominent fast fashion producers are taking steps in that direction.[116]

Paraguay's textiles and apparel industry is highly integrated with Brazil. Two-thirds of Paraguay's textiles and apparel exports over the past five years went to Brazil. Textile exports to Argentina (18 percent), the United States (10 percent) and Uruguay (4 percent) followed. With the right investments, Paraguay could produce for Mercosur fast fashion markets with shorter lead times than China.

The textiles and apparel industry serves both domestic and foreign markets. Many companies are focused almost exclusively on exports. These are usually medium and large enterprises that operate under the maquila regime. They import raw materials from countries within Mercosur, particularly Brazil and Argentina, as well as China and India. Higher-quality fabrics are imported from Italy and Turkey. Some companies in Paraguay offer only basic cut, make, trim (CMT) services while others engage in full-package production (FPP).[117] These firms can produce large volumes,[118] serving major international clients through both direct exports and subcontracted arrangements. Some companies

Figure 7.2

Companies mostly in the downstream segments of the value chain



Source: Competitiveness Market Study (2024).

specialize in environmentally friendly products by using organic materials to produce sustainable jeans, for example. Export-oriented firms export largely to Mercosur and the US. Other companies serve only the domestic market. These are predominantly small ateliers or medium-sized enterprises, handling everything from design to finishing, selling branded products through their own retail outlets and online channels. They produce a diverse range of items, including athletic wear and lingerie. While these companies typically source some materials locally, they import fabrics and other inputs from regional markets such as Brazil and Argentina.

Growth opportunities in textiles and apparel include expanding existing product lines and full-package production (FPP). Several Paraguayan exporters are under FPP subcontracting serving international clients, undertaking design, pattern making, and fabric sourcing, beyond the CMT model. Expanding FPP can help companies reach higher-value markets by integrating upstream segments of the value chain, particularly product development, design, pattern making, and fabric sourcing.

Vertical integration of production can improve sustainability and traceability and can shorten lead times for domestic production and exports. There is potential for vertical integration of the production process, particularly in the manufacturing of organic cotton yarn and fabrics to satisfy foreign demand for sustainable garments in the medium term. Paraguay has seen a recent resurgence in cotton production[119] which is still in its early stages.[120] By attracting local and regional investors to establish yarn and fabric production facilities, Paraguay could significantly shorten lead times for both domestic manufacturers and regional exports, particularly to Mercosur and the US market.

The growth of global e-commerce provides an opportunity for Paraguay's textiles and apparel sector to expand their market reach. Enhancing e-commerce capabilities will require skills in digital sales and possibly foreign firms with expertise in e-commerce logistics. Paraguay's main constraints for this opportunity are the limited airport capacity, the scarcity of international payment platforms, and the absence of double taxation treaties between Paraguay and major trading partners.[121]

Overall, Paraguay's competitiveness in textiles and apparel is mixed. Paraguay's ranking along several competitiveness indicators vis-à-vis other LAC economies can be seen in the heatmap in table 7.1, where green indicates a better ranking and red indicates a less favorable ranking. Paraguay's imports of textile inputs are expensive compared to those in the region, due to both tariff and non-tariff measures (NTMs). Estimates suggest that NTMs in Paraguay can increase trade costs by the equivalent of at least 4 percent; together with the prevailing high tariffs, NTMs can account for close to 15 percent of total costs (Reis et al. 2018, Arenas et al. 2021 and World Bank 2022).

Among its Mercosur peers, Paraguay fares poorly in logistics performance, both in terms of quality of trade and transport infrastructure and ease of arranging competitively priced shipments. However, Paraguay's seven industrial parks (one public and six private) can help overcome infrastructure and logistics deficiencies. Currently, companies can rent or buy land and office space in the industrial parks and, in some cases, benefit from sandbox services such as accounting and streamlining interactions with public agencies. Two additional parks are planned to serve the textiles and apparel sector, one in Pilar and another in the south of the country.

The picture is similarly mixed on the labor front. Availability of skilled labor is weak, reflecting low tertiary school enrollment. About 80 percent of formal firms in the country

say they face difficulties filling vacancies,[122] significantly above the LAC average of 65 percent.[123] On the positive side, labor costs are a major source of competitiveness for Paraguay's textile industry. Economy-wide, wages in Brazil are 11 percent higher on average than in Paraguay. Total labor costs are even higher when taking non-wage costs such as paid leave or severance into account, according to the Inter-American Development Bank (IDB).[124] Paraguay's unit labor costs in textiles, which make up 30 percent of overall production costs, are competitive relative to Brazil and other competitors such as Morocco.[125]

Current worker skill levels are inadequate to meet the needs of higher value-added production and markets. The current textiles and apparel cluster in Paraguay is supported by an ecosystem of public and private universities, vocational training institutions and associations. However advanced fashion management studies curricula, including marketing and sales, are inadequate for moving up the value chain. Most of the Paraguayan institutions teach obsolete techniques, and their machinery and equipment are outdated. Moreover, no entity, either public or private has a clear mandate to train students in modern manufacturing techniques, and the use of the latest equipment. There are insufficient incentives for firms to invest in higher skill positions such as designers, pattern makers and procurement specialists. Training coordinated between universities, vocational training institutions, associations and the private sector in modern fast fashion skills and management could increase Paraguay's competitiveness.

On the surface, Paraguay has a significant advantage due to its low industrial electricity prices (figure 1.7). However, as discussed in sections 1 and 6, this has come at the cost of reliability and quality, reflecting underinvestment in transmission and distribution.

7.2 Constraints and Recommendations to Increase Private Investment in Textiles and Apparel

CONSTRAINT 1. Customs mismanagement results in commercial fraud and smuggling. Despite progress in automating document processes and reducing fragmentation of tax and customs administration,[126] according to the IMF, customs clearance remains complex and burdened by unnecessary procedures. In addition, weaknesses in customs and the judicial system create significant obstacles for private companies in Paraguay.[127] According to the 2024 B-Ready report, Paraguay received a score of 1.25 (out of 5.0) on the share of firms identifying customs and trade regulations as major or severe constraints. This was better than Colombia (0.50) but behind Costa Rica (2.35).

Table 7.1

Ranking LAC countries' manufacturing and trade competitiveness

Country	Manufacturing conditions						Trade and logistics					Access to inputs		
	Labor costs, 2022[a]	Average hourly earnings of employees, 2023 or latest (US$)[b]	Tertiary school enrollment, 2021 or latest (%)[c]	Corporate tax rates, 2022 (%)[b]	Average industrial electricity prices, 2021 (US$/MWh)[b]	Electricity reliability (% of firms experiencing outages)[d]	Trade openness, 2022[e]	LPI: Quality of trade and transport infrastructure rank, 2023[f]	LPI: Ease of arranging competitively priced shipments rank, 2023[f]	LPI: Timeliness of shipments within schedule rank, 2023[f]	Cost to export, border compliance, 2019 (US$)[b]	Textiles imports, 2023 (US$, millions)[g]	Import unit costs of textile inputs, 2023 (score)[h]	Textiles exports, 2023 (US$, millions)[g]
Argentina	3.0	4	99	35	59	65	32	63	85	76	150	1,671	6,273	352
Bolivia	2.0	3		25	80	35	68	89	102	129	65	242	5,541	13
Brazil	4.1	3	55	34	144	46	39	47	68	46	862	6,374	4,171	4,436
Chile	3.3	5	92	27	175	43	75	63	85	65	290	4,898	5,637	468
Colombia	3.9	2	54	35	121	54	48	59	57	65	630	2,533	3,638	817
Costa Rica	2.4	4	58	30	171	49	80	68	75	65	450	671	5,903	151
Dominican Republic	5.0	2	61	27	129	54	54	68	111	76	488	1,424	6,511	993
Ecuador	3.2		53	25	78	62	58				560	955	3,634	123
El Salvador	3.8		30	30	127	48	87	118	91	65	128	1,816	2,796	2,752
Guatemala	3.3	2	22	25	132	54	55	89	75	116	310	1,805	2,663	2,241
Haiti	4.9			30	139		37	136	121	124	368		8,512	
Honduras	3.3	4	25	25	139	70	111	68	57	65	601		3,103	
Jamaica	4.3			25	222	81		89	111	93	876	120	5,730	1
Mexico	6.1	2	45	30	101	45	88	63	75	46	400	13,422	4,508	9,196
Nicaragua	3.6		20	30	179	50	115	132	75	93	240	1,955	4,259	1,888
Panama	3.8	6	44	25	153	22		44	47	55	270	559	6,613	4
Paraguay	3.5	2	38	10	61	83	74	80	85	87	815	490	7,884	303
Peru	4.7	2	34	30	91	52	58	80	47	55	630	2,859	4,109	1,847
Uruguay	3.0	7	68	25	127	57	57	68	85	65	1,038	482	3,428	166

Source: IFC calculations.

a. Index scores range from 0 to 10, where 10 is lower costs.
b. Less is lower costs.
c. gross, percentage within official age group.
d. Less is fewer outages.
e. Calculated as the sum of the country's exports and imports as a share of its GDP.
f. Out of 139 countries, where less is better.
g. Includes everything under Harmonized System (HS) nomenclature chapter 50–63, which is the pre-defined textiles section by Harmonized Tariff Schedule.
h. Weighted average per country of unit import prices across all the inputs considered as textiles inputs. Less is lower costs.

← Least Most ideal →

RECOMMENDATION 1. Streamline trade and customs regulations: The World Bank's 2022 *Accelerating Paraguay's International Integration Through Enhanced Trade, Investment and Competition Policies* report details several recommendations on trade policy and administration. Those that are most relevant to the textiles and apparel sector are:

a. The Ministry of Industry and Commerce (MIC) and the *Direccion Nacional de Ingresos Tributarios* (DNIT) should eliminate duplication of import and export processes for investors by increasing interoperability between the two single windows for import and export (the VUI and VUE).

b. The Customs Code should be amended to fully digitize the customs dispute process of the National Customs Directorate (DNA).

c. MIC and DNIT should expand the "Authorized Economic Operator" status to facilitate advanced declarations, thereby reducing delays at border posts with Brazil and Argentina.

CONSTRAINT 2. Access to capital is a constraint to textile firms expanding production. In many countries, the most common financing product used by firms in the apparel sector is factoring, but uptake of factoring in Paraguay is limited. In June 2020, Paraguay adopted regulations on factoring which created a new electronic system to register the assignment of receivables based on factoring contracts called SEOG (*Sistema Electrónico de Operaciones Garantizadas*). This system is managed by the Central Bank (BCP), and many of its features follow best practices (notice-based, unified geographically, accessible both by individuals and firms, etc.). However, use of the electronic invoicing system (SIFEN) needed to certify the validity of the e-invoice for third parties is not yet compulsory, limiting the use of factoring.

RECOMMENDATION 2. To expand the use of factoring, the DNIT should make electronic invoicing compulsory. Factoring needs to be promoted as a financial product for working capital needs. Requiring the use of SIFEN by apparel manufacturers that benefit from the maquila regime would encourage the uptake of factoring. DNIT announced in September 2024 that electronic and digital invoices will be mandatory for active taxpayers by early 2026.

Table 7.2

Priority policy recommendations for increasing private investment in textiles and apparel

Constraint	Recommended actions
Customs mismanagement results in commercial fraud, smuggling and increased complexity of customs processes.	Increase interoperability between the VUI and VUE to reduce duplications of import and export procedures for investors. Fully digitize the customs dispute process. Expand the "Authorized Economic Operator" status.
	Responsible government entities: MIC, DNIT, DNA
Insufficient use of the electronic invoicing system (SIFEN) limits the use of factoring, which could help expand access to working capital.	Make electronic invoicing through the SIFEN compulsory to expand the use of factoring as a financial product for working capital needs.
	Responsible government entities: DNIT, MIC

Appendixes

Appendix A

Potential Increases in Private Investment and Jobs for Rice and Pork

A.1 Rice – Private Investment

A.1.1 *Estimated Impact*

— US$155.3 million to US$310.7 million in investment by 2033

A.1.2 *Methodology/Approach*

— Estimated planted area (Hectares) to 2033, and corresponding capital investment, if a conductive business environment is in place and ESG measures are adopted.

A.1.3 *Assumptions*

— Low and high estimates correspond to expanding current planted area by 50,000 hectares and 100,000 hectares, respectively, consistent with achieving the maximum feasible rice output.

Table A.1 shows the capital investment assumptions for expanding the planted area by 100,000 ha.

A.1.4 *Further Assumptions*

— Rice output is expected to reach 1.5–1.8 million metric tons (MT) annually by 2033, assuming yields are at current levels (6.6 MT/ha). In an optimistic scenario, production

Table A.1

Capital investment assumptions for expanding the planted area by 100,000 hectares

Application	Capacity required for 1,000 hectares	Reference equipment	Reference price (US$, thousands per unit)	Total units required	Total investment value (US$, millions)
Agricultural machinery					
Sprayer	1.500 liters	Jacto Uniport 3030	330	50	16.5
Tractors	400 HPs	John Deere 7200J	155	200	31
Heavy disc harrow	120 discs	Tatu Marchesan GNCRP (60 discs)	24	200	4.7
Grader plane	1	GTS Planer 710	40	100	4
Ridger	1	Metaltec TPA 12	15	100	1.5
Sower	1	John Deere 1890	170	100	17
Harvester	50 feet	John Deere S550	320	200	64
Hopper	60,000 liters	Montecor (28,000 liter capacity)	50	300	15
Fertilizer spreader	1	Uniport 5030 NPK	270	100	27
Engine, pump and control	1	Pump SAER NCBK800/670 (Engine 4P IP55 380/660 430HP WEG)	100	100	10
Dryer and silos			0.127	945,000 tons	120
Total					310.7

Source: A-Fines in consultation with machinery and input sellers.

would reach 2.2 million MT per annum by increasing yields to 8 MT/ha (Improved agronomic management and wider use of certified seeds will be required).

— The projected growth of the rice frontier—regions or areas where rice cultivation is expanding into new territories—is expected in departments relying on the Paraguay

River for irrigation, particularly Ñeembucú. Itapúa and Misiones departments which have reached or are close to reaching maximum carrying capacity for water usage, while the expansion in the Chaco region, specifically in Pte. Hayes depends on the "rice route" project development and is estimated to take more than five years.

— Investment requirements for drying and storage facilities are estimated at US$127/MT on average.

A.2 Rice – Jobs

A.2.1 *Estimated Impact*

— 2,300 additional jobs created by 2033: 1,400 permanent and 900 temporaries.

A.2.2 *Methodology/Approach*

— Jobs that would be created in the 100,000 Ha expansion scenario consider the employment index developed by MAG and FEPARROZ. Job multipliers for permanent and temporary jobs were calculated based on data from surveys of the country's leading producers and processing players.

A.2.3 *Assumptions*

— Jobs estimations per hectare provided in the interviews (ARROZAL, GICAL, AGRIPLUS, and PAYCO) are consistent with previous references (14 permanent jobs and nine temporaries per 1,000 ha).

— Jobs created per hectare are assumed to be kept constant by 2033.

A.3 Pork – Private Investment

A.3.1 *Estimated Impact*

— US$41 million to US$163 million in investment by 2030

A.3.2 *Methodology/Approach*

— Estimated finished hogs in 2030, and corresponding capital investment, if a conducive business environment is in place and ESG measures are adopted.

A.3.3 *Assumptions*

— Maximum level of finished hogs by 2030: 2.2 million hogs, from its current level of 745,000 hogs.

— Low and high estimates correspond to 50 percent and 200 percent of the increase in investment consistent with achieving the maximum feasible pork output.

Table A.2 shows the capital investment assumptions for tripling finished hogs by 2030 (potential projection estimated by SENACSA and the country's meat export industry—UPISA).

A.3.4 *Further Assumptions*

- At the farm level, hog housing requirements vary for each production stage. Gestation sheds typically accommodate one sow per 1.6 square meters with basic construction materials and techniques. However, best practices recommend concrete, steel structures, brick walls, a locked roof, slat flooring, and insulation. The average construction cost is around US$130 per square meter, but it can increase by up to 30 percent with roof insulation and flooring. Improved pig comfort leads to higher farrowing per year, lower mortality rates, and more piglets per mother, reducing the net space needed for each sow.
- Farrowing houses are the most expensive buildings on hog farms, requiring double the space of gestation sheds and special facilities to support the mother and protect piglets from crushing. Construction costs vary with scale, and the reference used for the calculations was US$1,000 per square meter for a 600-sow farm. Nursery building costs are slightly higher than gestation sheds but can accommodate more piglets. A 25-square-meter cell can house up to 80 piglets for US$165 per square meter.

A.4 Pork – Jobs

A.4.1 *Estimated Impact*

- 26,200 additional jobs created by 2030: 5,200 direct jobs and 21,000 indirect jobs

A.4.2 *Methodology/Approach*

- Corresponding jobs that would be created in the 200 percent hogs' expansion scenario.

A.4.3 *Assumptions*

- Job estimations are based on SENACSA and UPISA's current records on job creation.
- Jobs created multipliers used are assumed to be kept constant for 2022–2030.
- The jobs generated at the processing plant level are mostly formal; however, at the farm level, many may be self-employment by members of the producer's family.

Table A.2

Capital investment assumptions for tripling finished hogs by 2030

Description	Quantity	Unit	Unit cost (US$, thousands)	Total (US$, millions)	Assumptions
Increased finished hogs	1,490,146	Hogs	n.a.		
Increased sows	70	Sows	350	24.5	
Increased boars	467	Boars	5	2.3	
Fattening facilities	509,133	1 m^2 per hog	165	84	Monthly slaughtering x 4 months fattening cycle
Growing facilities	81,492	25 m^2 per 80 piglets	165	13.5	Monthly slaughtering x 2 months nursery cycle
Farrowing house	26.25	2.25 m^2 per sow	1	26.3	Increased sows x 2 farrows a year / 12 months x 1 month nursing
Gestation shed	70	1.6 m^2 per sow	135	9.1	Not farrowing sows
Driers and silos	12,105	Tons	150	1.8	10 days of daily demanded feed
Mixers and pelletizers	151	Tons per h	11.85	1.7	1 day demanded feed
Total				163.2	

Source: A-Fines consultancy based on SENACSA slaughtering data, EU standards for pig farms, interviews, and customer office records.

Appendix B

Potential Increases in Private Investment and Jobs for Forestry

B.1 Forestry – Private Investment

B.1.1 *Estimated Impact*

— US$192 million to US$237 million in investment by 2030

B.1.2 *Methodology/Approach*

— Estimated costs of planting 100,000 hectares of Eucalyptus trees in the Eastern region.

B.1.3 *Assumptions*

— Assuming 100,000 ha planted over the next 5 years.
— Lower range estimates correspond to dense plantations for biomass and pulp projects and higher range estimates correspond to dense plantations for solid wood.
— This would increase total planted area from 206,000 ha to over 300,000 ha.

Tables B.1, B.2, and B.3 show the corresponding investment assumptions for expanding the planted area by 100,000 ha. CapEx and OpEx costs for planting, with land lease.

Table B.1

Wood for pulp logs

Parameter	Annual cost per hectare (US$)
Land lease cost	100.00
Legal fees	4.58
Land evaluation	0.67
Land cleaning and preparation	21.35
Planting	740.88
Periodic stand treatments (pruning, etc.)	151.54
Seedlings and input expenses	691.37
Risk management and social programs	81.67
Production supervision	77.35
Forest inventory	8.17
Fixed assets investments	41.33
Total	1,918.91

Table B.2

Biomass

Parameter	Annual cost per hectare (US$)
Land lease cost	150.00
Soil preparation and planting	1,240.40
Maintenance year 1	245.87
Maintenance year 2–6	119.30
Disassembly	357.91
Fixed assets investments	18.89
Total	2,132.37

Table B.3

Solid wood

Parameter	Annual cost per hectare (US$)
Land lease cost (silvopastoril)	150.00
Legal fees	4.94
Land evaluation	13.53
Land cleaning and prep	21.35
Soil preparation and planting	718.45
Pruning, weeding and ant control	621.00
Seedlings and input expenses	567.61
Risk management and social programs	116.67
Production supervision	102.55
Forest inventory	8.17
Fixed assets investments	41.33
Total	2,365.60

B.2 Forestry – Jobs

B.2.1 *Estimated Impact*

— 3,000 additional jobs created by 2030

B.2.2 *Methodology/Approach*

— Jobs would be created in 100,000 ha of expanded forestry plantations. Jobs multiplier for jobs in forestry based on World Bank survey. At 30 jobs per 1,000 ha (see assumptions), an additional 100,000 ha of planting would

B.2.3 *Assumptions*

— It is estimated that companies created more than 2,000 direct, formal, full-time jobs in 2023. This is equivalent to more than 30 jobs per 1,000 ha, 10 times the employment generated by cattle-raising in the same area.

Appendix C

Investment Potential in Solar PV

The CAPEX is based on solar generation and storage installations in the US as of 2022.[128] CAPEX does not include financing costs, payback period, operations, maintenance and transportation costs. Furthermore, CAPEX does not include investment in self-generation (due to the current regulatory framework) or investment in networks (transmission and distribution), particularly given the reservations expressed by ANDE. The CAPEX date corresponds to the project's start date according to ANDE. However, in practice, the investment would take place at least one year before the project became operational in the case of SPV, and several years earlier in the case of Reservoir Hydropower.

The generation expansion is as planned in ANDE's 2021 Indicative Plan. In its plan, ANDE includes batteries. The scenario without Storage does not consider the installation of batteries in the system. The scenario with Storage assumes that the SPV is complemented with batteries. Moreover, ANDE considers a given number of batteries. The analysis in the CPSD considered a scenario with Storage using the optimal combination of batteries and solar calculated by NREL, not ANDE's quantity of batteries. For SPV, the CSPD analysis used NREL Utility Scale Class 7 projects, which have radiation levels similar to those in Paraguay. For large-scale hydropower, NREL Hydropower NSD 2 was used, and for small hydro (PCH), Hydropower NSD was used. The projections include the evolution of technology costs, for which NREL has three scenarios. The CPSD analysis used the moderate (middle) scenario, corresponding to maintaining current levels of R&D.

The authors have made significant efforts to estimate the most feasible technical configurations and costs based on the available data. However, as these costs are site-specific and subject to change, the estimates remain uncertain.

Table C.1

Investment potential, by year and energy source

Year	New hydro (MW)	New solar PV (MW)	CAPEX/MW in solar PV ($, millions)	Total CAPEX in solar PV ($, millions)
2024	0	0	0.00	0.00
2025	0	200	2.28	455.08
2026	0	200	2.19	438.29
2027	0	100	2.11	210.75
2028	0	0	0.00	0.00
2029	0	0	0.00	0.00
2030	0	0	0.00	0.00
2031	0	0	0.00	0.00
2032	0	0	0.00	0.00
2033	1,425	150	1.66	248.35
2034	0	150	1.59	238.35
2035	0	150	1.52	228.35
2036	2,688	150	1.50	224.67
2037	0	150	1.47	220.98
2038	0	150	1.45	217.30
2039	0	150	1.42	213.61
2040	0	150	1.40	209.93
Total	4,113	1,700		2,905.69

Source: IFC modeling and analysis.

Appendix D

Investment Potential in Light Manufacturing

To estimate sectoral investment projections of tradable sectors, a country's export channel was used to facilitate economies of scale, which are critical for supporting the growth of expanding industries. Export projections were converted into investment projections by establishing a relationship between expected changes in exports and the investment response in a country's subsectors. To this end, a simple conceptual framework was defined in which investment projections $\widehat{Investment}_{is \in S_i}$ for country i and subsector s are based on export projections $\widehat{Export}_{is}$ and a cross-country export-to-investment elasticity ε:

$$\widehat{Investment}_{is \in S_i} = \widehat{Export}_{is \in S_i} \times \varepsilon \quad (1)$$

Estimating equation (1) requires two inputs: export projections and a cross-country elasticity of export to investment , which captures the responsiveness of exports to changes in investment.

D.1 Export Potential

To determine export potential at the country-product level, the International Trade Center's (ITC) methodology of Export Potential[129] (Decreux and Spies 2023) was used. This structural model identifies the export growth potential of existing products from supply capacity in the exporting country, demand conditions in the target market and bilateral linkages between the two.[130]

Export potential is a forward-looking indicator that projects supply and demand five years into the future using GDP projections, expected population growth, and import demand elasticities. Export potential also takes into account current and future tariffs, re-exports and the physical distance between two countries.

Export potential is the difference between potential and actual exports for a given exporter, product, and destination market, and represents a value that could be achieved by 2028 based on the model. Two components explain untapped export potential. The first concerns *static* trade frictions, such as a lack of information or difficulty in complying with rules and regulations in the target market, mismatch between product characteristics and consumer preferences, or difficulty in finding buyers. To realize the untapped *static* export potential, frictions need to be identified and addressed, and enabling conditions need to be created to accompany growth trends. Implementing CPSD policy recommendations is one way to address the frictions. The second component of untapped export potential reflects *dynamic* expectations of growth in the coming years. If the growth expectations of the exporter, the destination market and competitors materialize as projected, additional exports will become feasible. Country export projections are aggregated from HS 6-digit products *p* to the FDI fDi subsector level *s*, using NAICS 5-digit industries as an intermediate step, following Pierce and Schott (2012).

D.2 Export to Investment Elasticity ε

To estimate the export to investment elasticity , global data for both exports and investments at the country-year level between 2010 and 2021 was used.[131] Export data come from BACI (Gaulier and Zignago, 2010), which reconciles export transactions and represents the data standard in the international trade literature. Investment data come from the Multinational Revenue, Employment, and Investment database (MREID), which tracks *realized* foreign direct investment (FDI) by multinational firms (Bergstrand, 2023). Specifically, authors focused on the fixed assets of all affiliates as the preferred measure of investment. This is the broadest measure of investment, including tangible assets as well as greenfield and brownfield investments. Source and destination countries considered offshore financial centers (OFCs) were excluded in order to focus on investments in real assets, rather than those aimed at tax optimization (Pogliani and Wooldridge, 2022).[132] Excluding these 22 countries also helps to increase the predicted variance of the FDI forecast, while reducing the fluctuations in total FDI flows. Taken together, this leaves us with a dataset of export and investment data for 159 countries between 2010–2021.

Next, authors determined the relationship between investment and exports through a system generalized method of moments (GMM) estimation, following Vujanović

et al. (2021).[133] This dynamic panel model accounts for persistent investment trends, reverse causality and other endogeneity concerns (Blundel and Bond, 1998). More specifically:

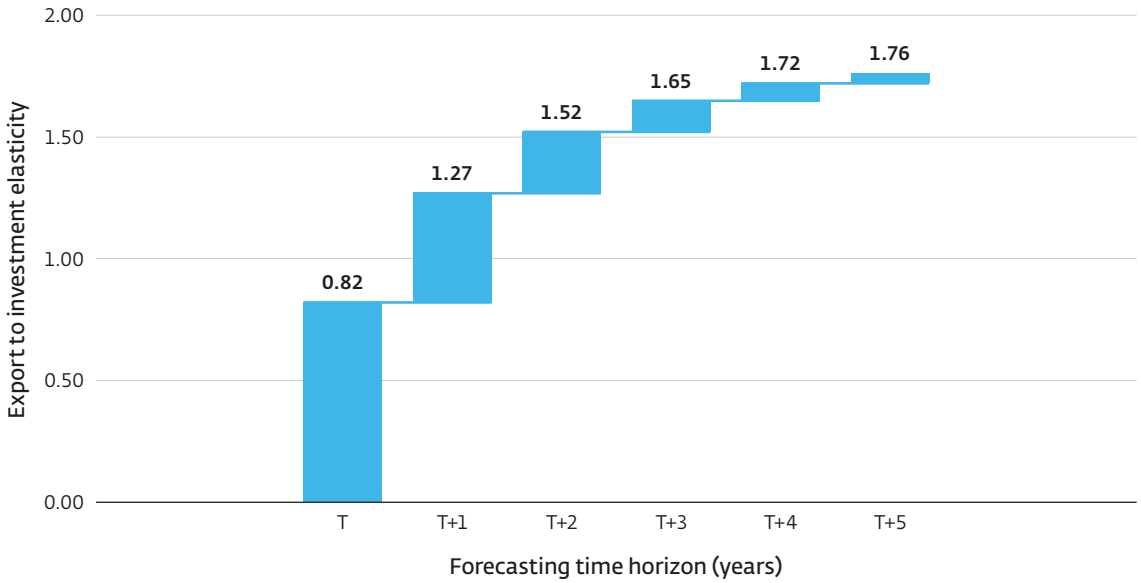
$$Investment_{it} = \alpha_1 Investment_{it-1} + \alpha_2' + \epsilon Export_{it} + \mu_i + \mu_t + u_{it} \quad (2)$$
$$u_{it} = \eta + e_{it}$$

The outcome variable $Investment_{it}$ captures annual global FDI inflows to country i in year t; X_{it} is a vector of control variables;[134] $Export_{it}$ represents the export value of exporter i in year t, where ε is the estimated elasticity of interest; μ_1 and μ_t represent country and year fixed effects, respectively. The error term μ_{it} is the sum of the country-specific unobservable fixed effect and the idiosyncratic error term. We apply log-transformation to dependent and all independent variables, which makes it easier to interpret the effects in terms of percentage changes.

Figure D.1 summarizes the results from model (2).[135] Our coefficient of interest, the export to investment elasticity ε, is estimated at 1.76 over 5 years in our global sample, a time horizon consistent with the IFC 3.0's timeline of policy-induced private sector investment (IFC, 2023). The investment response to exports is statistically and economically significant and grows over time, albeit at a declining rate.

Figure D.1

Export to investment elasticity of system GMM model, by forecasting time horizon



Note: This figure plots the estimated elasticity of exports to investment, ε, based on the GMM regression results from equation (2). Total assets are the sum of current and fixed assets, including intangibles.

Acronyms

AAIP	Association of Industrial Auto Parts of Paraguay
AFD	Paraguayan Development Bank
ANDE	National Electricity Administration
AV	Autonomous Vehicles
AWD	Alternate Wetting and Drying
B2B	Business to Business
BCP	Central Bank of Paraguay
BNEF	Bloomberg New Energy Finance
CAPARROZ	Paraguayan Rice Industry Chamber
CBAM	Carbon Border Adjustment Mechanism
CCU	Paraguayan Association of Pork Producers
CEMAP	Chamber of Maquila Companies of Paraguay
CH4	Methane
CMT	Cut, Make, Trim
CNIME	National Council of the Export Maquiladora Industry
CPSD	Country Private Sector Diagnostic
DNIT	Unified Export Window and Customs
EMDE	Emerging Market and Developing Economies
ESG	Environmental, Social and Governance
ESIA	Environmental and Social Impact Assessment
EUDR	EU Deforestation Regulation
EV	Electric Vehicle
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
FEPARROZ	Paraguayan Federation of Rice Producers
FLAR	Latin American Fund for Irrigated Rice
FMD	Foot and Mouth Disease
FPP	Full-Package Production
FSC	Forest Stewardship Council
GHG	Greenhouse Gas
IFC	International Finance Corporation
INBIO	Institute of Agricultural Biotechnology
INDERT	National Institute for Rural and Land Development

INFONA	National Forest Institute
INE	Instituto Nacional de Estadística
INIA	National Institute of Agricultural Research of Uruguay
INTN	National Institute of Technology, Standardization and Metrology
IPTA	Paraguayan Institute of Agricultural Technology
IRGA	Rio Grandense Rice Institute
LCOE	Levelized Cost of Energy
MADES	Ministry of Environment and Sustainable Development
MAG	Ministry of Agriculture and Livestock
MAI	Mean Annual Increment
MERCOSUR	Southern Common Market
MIC	Ministry of Industry and Commerce
MOPC	Ministry of Public Works and Communication
NREL	National Renewable Energy Laboratory
OECD	Organization for Economic Co-operation and Development
OEM	Original Equipment Manufacturers
PEFC	Programme for the Endorsement of Forest Certification
PPA	Power Purchase Agreement
PPP	Public-Private Partnerships
PTI	Itaipu Technology Park
PUT	Plan de Uso de la Tierra
PV	Photovoltaic
REDIEX	Investment and Export Network
REGS	Rice Export Guarantee Scheme
SBP	Sustainable Biomass Program
SENACSA	National Service for Animal Quality and Health
SENAVE	National Service for Plant Health and Seed Quality in Paraguay
SEOG	Electronic Guaranteed Operations System
SICOR	Paraguayan Foreign Trade Information System
SIFEN	National Integrated Electronic Invoicing System
SINAFOCAL	National Vocational Training System
SITRAP	Paraguayan Information, Procedures, and Processes System
SMEs	Small and Medium-sized Enterprises
SNPP	National Professional Promotion Service
SPF	Paraguayan Forest Certification System
SRP	Sustainable Rice Platform
STEM	Science, Technology, Engineering and Mathematics

UMIC	Upper Middle-Income Country
UNA-FCV	National University of Asuncion - Faculty of Veterinary Medicine
UPAP	Polytechnic and Artistic University of Paraguay
UPISA	Union of Producers of Itapua
USDA	US Foreign Agriculture Service
VAT	Value Added Tax
VMME	Vice Ministry of Mines and Energy
VUE	Single Window for Exports
VUI	Single Window for Imports
WBG	World Bank Group

Notes

1. Paraguay Country Economic Memorandum (CEM), World Bank Group, April 2024.
2. World Bank Enterprise Survey for Paraguay, World Bank (2023).
3. World Bank. Enterprise Surveys - Paraguay 2023 Country Profile (2024)
4. Electricity prices in Paraguay are less than 40 percent of the regional average, for both residential and business customers (OLADE, Latin America and the Caribbean Energy Price Report, April 2021).
5. World Bank, Business Ready (B-READY) 2024.
6. The Business Ready (B-Ready) report assesses the regulatory framework and public services directed at firms, and the efficiency with which regulatory framework and public services are combined in practice. See https://www.worldbank.org/en/businessready
7. The Financial Services indicator in the B-Ready report evaluates the quality of financial regulations, accessibility of credit infrastructure information, and operational efficiency of financial services across three pillars: ensuring effective regulation for lending, secure transactions, and electronic payments; enhancing access to credit information and collateral registries; and improving the ease of obtaining loans and processing e-payments.
8. For pork there is a need to build more secondary roads in Canindeyú, Alto Paraná, and Itapúa, linking small and medium farms to processing facilities. For rice, road infrastructure in the department of Ñeembucú should be a priority to develop the region's potential in rice.
9. For assumptions, please see appendix A.
10. See appendix A.
11. World Bank, *A Forest's Worth: Policy options for a sustainable and inclusive forest economy in Paraguay*, 2020.
12. Based on analysis undertaken for the CPSD and comparable to other internal calculations.
13. Internal World Bank estimates based on a survey of project developers.
14. FPP is a manufacturing approach where the supplier manages everything from design to delivery. This includes creating designs, sourcing materials, manufacturing, quality control, finishing, and logistics. Key capabilities include skilled technicians, reliable suppliers, modern facilities, and efficient project and logistics management.
15. World Bank (2021) Changing Wealth of Nations.

16. International Monetary Fund (July 2024), 2024 Article IV Consultation, Third Review Under the Policy Coordination Instrument, Modification of Targets, and First Review Under the Arrangement Under the Resilience and Sustainability Facility, page 7.
17. IMF Article IV Consultation, July (2024)
18. Paraguay's credit rating upgrade to investment grade, Moody's Investors Service (2024)
19. Paraguay Country Economic Memorandum (CEM), World Bank Group, April 2024.
20. Paraguay Country Climate Development Report (CCDR), World Bank Group, 2024
21. Foreign Direct Investment, net inflows (percent of GDP), World Bank (2023).
22. Bertelsmann Stiftung. BTI Country Report 2022: Paraguay. Gütersloh: Bertelsmann Stiftung, 2022. Available at: https://bti-project.org/fileadmin/api/content/en/downloads/reports/country_report_2022_PRY.pdf
23. Inter-American Development Bank (IDB). FDI Flows to Paraguay: What Do Investors Prioritize?. Washington, DC: IDB, 2020. Available at: https://publications.iadb.org/en/fdi-flows-paraguay-what-do-investors-prioritize
24. Paraguay Local Currency Bond Offering Memorandum, Goldman Sachs (2024)
25. Public investment has declined since 2000, stabilizing at around 3 percent of GDP, half of the average annual public investment in the region, and projected to decline further to around 1.5 percent of GDP (2024, IMF Article IV Consultation).
26. This is partly due to a high rate of tax evasion (estimated at 26 percent), although the recent introduction of electronic invoicing for taxpayers should improve enforcement. The VAT rate is low (at 10 percent), and there are generous personal deductions, a high minimum income threshold, and significant tax expenditures in special tax regimes.
27. Worldwide Governance Indicators (WGI) are a research dataset summarizing the views on the quality of governance provided by a large number of enterprises, citizens and expert survey respondents in industrial and developing countries. Data are gathered from survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms. The WGI do not reflect the official views of the World Bank, its Executive Directors, or the countries they represent. The WGI are not used by the World Bank Group to allocate resources.
28. World Bank Enterprise Survey for Paraguay, World Bank (2023).
29. Share of firms expected to give gifts to obtain permits or connections: import licenses (5.4 percent in Paraguay vs 2 percent LAC average), electrical connections (17.5 percent in Paraguay vs 7.1 percent LAC average), water connections (22.5 percent in Paraguay vs 5.6 percent LAC average). World Bank Enterprise Survey for Paraguay, (2023).
30. Estrategia Nacional de Combate a la Corrupción (ENCC), Gobierno Nacional de

Paraguay, 2023.

31. *Una Visión Estratégica para el Fortalecimiento del Marco de Gobernanza Pública en Paraguay.* IMF, 2021.
32. World Bank Enterprise Survey for Paraguay, World Bank (2023).
33. The government has recently approved a renewable energy law (6977/2023) enabling private sector investment in generation.
34. Source: OLADE, Latin America and the Caribbean Energy Price Report, April 2021.
35. World Bank InfraSAP for Paraguay, 2021.
36. World Bank. Enterprise Surveys - Paraguay 2023 Country Profile (2024), page 6.
37. World Bank, Doing Business 2019 data for Getting electricity: System average interruption duration index (DB16-20 methodology) and System average interruption frequency index (DB16-20 methodology).
38. The World Bank. Consultoría Empresarial – Gestión de Pérdidas de Energía V7. ANDE. Dic. 2023.
39. Renewable Readiness Assessment – Paraguay, International Renewable Energy Agency (2021)
40. World Bank InfraSAP for Paraguay, 2021.
41. National Logistics Plan. Ministerio de Obras Públicas y Comunicaciones y Ministerio de Industria y Comercio, 2020.
42. Caminos Para La Integración, CAF (2021).
43. ITC, UN Comtrade Data.
44. USDA, Foreign Agriculture Service.
45. ITC, UN Comtrade Data.
46. The eastern region of Paraguay is characterized by abundant water resources, while the western region, particularly the central and northern parts, experience scarcity. As a result, the focus of production in these areas has been primarily on cattle ranching rather than agriculture.
47. According to the Ministry of Agriculture and Livestock (MAG), approximately 1 million hectares are suitable for rice production. These are lowlands, type IV, with low soil limitations.
48. PROCAMPO is the product developed by AFD to finance the primary economic sector. It is focused mainly on major and/or minor livestock investment projects, agricultural investment projects, irrigation solutions, and complementary infrastructure.
49. MAG and the Paraguayan Federation of Rice Producers (FEPARROZ) did not reach an agreement on how to pay the membership fee, which led to its interruption.
50. FLAR brings together various organizations across Latin America and the Caribbean,

including the strategic partner International Center for Tropical Agriculture, to provide advanced rice breeding lines suitable for both tropical and temperate zones. Membership would grant access to cutting-edge rice hybrid technology through research, improve crop management practices for soil conservation, and support the transformation of rainfed agriculture to irrigation through rainwater harvesting.

51. Paraguay ranks 92 out of 141 countries in the infrastructure pillar of the World Economic Forum's Global Competitiveness Index (2019).
52. InfraSAP Paraguay, 2021. World Bank.
53. Rural access remains a strong concern, with a rural accessibility index of 42 percent (implying that almost 60 percent of the population does not have reliable access to the road network). InfraSAP Paraguay, 2021.
54. Requirements included in the Sustainable Rice Platform include farm management, pre-planting, water use, nutrient management, integrated pest management, harvest and postharvest issues, health and safety, and labor rights.
55. This gas is released through the interaction of plant roots with soil bacteria in the anaerobic environment caused by flooding. According to the European Union Methane Strategy, methane is the second most important greenhouse gas contributor to climate change after carbon dioxide. Its ability to trap heat in the atmosphere is even stronger than that of carbon dioxide: on a 100-year timescale, methane has 28 times greater global warming potential than carbon dioxide and is 84 times more potent on a 20-year timescale.
56. According to the International Rice Research Institute, Alternate Wetting and Drying reduces water use by up to 30 percent and greenhouse gas emissions by up to 50 percent while maintaining yields.
57. The feed for pigs mainly consists of corn and soybeans, both of which are commercially produced in Paraguay.
58. Interpig 2022, Embrapa.
59. UPISA's projection is based on a 200 percent expansion in piglet production. An expansion of 50 percent would raise pork exports to US$130 million.
60. Transforming grain into pork would significantly increase export value added: In 2022, to generate 1 ton of pork for export, the Paraguayan pig industry required 1.75 tons of corn and 0.5 tons of soybeans. According to SENACSA and UPISA, making full use of current overcapacity would consume only 7.8 percent of the corn and 1.2 percent of the total soybeans produced in the country.
61. According to UPISA, the sector generated 12,500 jobs in 2023 (2,500 direct and 10,000 indirect jobs).
62. "Free of FMD with vaccination" means that the disease is controlled through vaccination, while "free of FMD without vaccination" indicates that the disease has

been eradicated without the need for vaccination, resulting in a higher level of disease control and fewer trade restrictions.

63. Defined as a common management and husbandry practice for biosecurity. Maintenance of health status is achieved through the application and verification of the integrity of the entire common biosecurity management system implemented in a compartment, as well as through surveillance.
64. InfraSAP Paraguay, 2021. World Bank.
65. The Bioceanic Corridor is divided into three sections. The first section (275 km) was inaugurated by the previous administration. "Section 3" between *Mariscal Estigarribia* and *Pozo Hondo* (224 km) has been adjudicated, and work began in June 2024. "Section 2", which will connect Cruce Centinela with Mariscal Estigarribia, will be built after section 3, considering that Highway PY09 can currently be used as a bypass to join sections 1 and 3.
66. With the Bioceanic Corridor, producers can save up to two weeks of travel time to Asia. According to the government, by utilizing deep-water ports on the Pacific Ocean, such as those in Chile, they can save time to reach Asian markets.
67. Producers in the country report that approximately 50 liters of water per day are required per animal, with 30 liters for consumption (based on an average animal weight), 10 liters for cleaning, and 10 liters for air conditioning.
68. One of the main gaps in the ESG country system in Paraguay is that only a few municipalities have already put land use plans into effect, and in those cases, the plans are too generic to be able to guide decision-making on ESG matters.
69. Plantations are primarily located in the departments of Caazapá (21 percent), San Pedro (16 percent) and Concepción (13 percent).
70. Davis RR, Cubas-Báez A, Cubbage F, Kanieski da Silva B. 2024. Plantation forestry in Paraguay Emerges. J.For.Bus.Res. 3(1): 130-150.
71. Including a Paraguay-Swedish joint venture and another joint venture between Swedish and UK investors. https://www.astartecp.com/news/astarte-capital-partners-and-silvipar-ab-close-inaugural-impact-forestry-fund-325m-well-above.
72. The MAI (Mean Annual Increment) is the volume of wood growing on one hectare of forest in one year (cubic meter per hectare per year) on average since the forest has been established. MAI for tree species can vary significantly depending on climate, soil quality, and forest management practices. For that reason, average MAIs were used. The MAI range for Paraguay is based on several sources, including: industry sources, FAO, Cubbage (2022) and the VMME.
73. Internal World Bank estimates based on a survey of project developers.
74. Biomass is renewable organic material that comes from plants and animals. Biomass

can be burned directly for heat or converted to liquid or gaseous fuels through various processes. In this chapter, biomass refers only to biomass from wood and wood processing waste (e.g. firewood, wood pellets, and wood chips, lumber and furniture mill sawdust and waste).

75. Producción y consume de biomasa forestal con fines energéticos en el Paraguay. 2019. Viceministro de Minas y Energía.
76. WBG calculations based on the methodology of the Deputy Ministry of Mines and Energy.
77. WBG calculations based on methodology of the Deputy Ministry of Mines and Energy and Davis et al.
78. INFONA, Reporte de Nuestros Bosques, 2023
79. Decreto Nº 1788/2024 por el cual se establece los regímenes de certificación, control y promoción del uso de bioenergías provenientes de plantaciones forestales o bosques nativos manejados para asegurar la sostenibilidad de estos recursos renovables dentro del territorio nacional, de conformidad con el decreto nº4056 del 14 de setiembre de 2015.
80. Soy, beef, palm oil, wood, cocoa, coffee, and rubber.
81. The FSC certification ensures that products come from responsibly managed forests that provide environmental, social and economic benefits.
82. Internal World Bank Group analysis, including a survey of project developers.
83. Industrial roundwood, as defined in FAO Forest Products Yearbook, includes all industrial wood in the rough (sawlogs and veneer logs, pulpwood and other industrial roundwood) and, in the case of trade, chips and particles and wood residues. https://www.fao.org/4/w7705e/w7705e0b.htm
84. INFONA.
85. World Bank 2020. *A Forest's Worth: Policy options for a sustainable and inclusive forest economy in Paraguay*.
86. Assuming average pulp prices of US$650 per ton.
87. Between 2016 and 2023, eighteen *Proforestal* loans were granted for a total value of US$67.1 million, with terms ranging from 6 to 12 years. Of this amount, a single loan of US$50 million (80 percent of the total loans granted through *Proforestal*) was granted to one company in 2023. The remaining US$12.6 million went to offtake contracts with that company.
88. As of November 2024, AFD is preparing a forest investment fund with the support of the WBG. This Fund would be a privately managed fund that aims to attract private capital from domestic and foreign investors.
89. Paraguay Country Climate and Development Report, 2024 (forthcoming).
90. Under Law No. 4890 "Derecho Real de Superficie Forestal", the owner of a property

suitable for forest plantations or natural forests grants to third parties or surface right holders a right to use or dispose of the forest goods planted on the surface of their property or on goods located on the property in the form of a natural forest. This is in accordance with environmental legislation.

91. https://www.abc.com.py/edicion-impresa/judiciales-y-policiales/2019/09/07/operativo-frustra-venta-ilegal-de-productos-forestales/.
92. INFONA is making some effort to correct these issues; one of the adjustments that is being proposed is to focus enforcement on the origin (e.g. plantation) and destination of the products (e.g., ports), avoiding controls en route, where the risk of corruption is higher.
93. World Bank 2024. *Bioeconomy Paraguay: Innovation and Economic Diversification.*
94. Global Forest Watch.
95. No. 2524/2005 and updated with No. 6676/2020, FAO Forest Resources Assessment, 2020.
96. Reporte de Cobertura Forestal y Cambios de Uso de la Tierra 2020-2022.
97. Total energy generation was around 42 GWh in 2022, with two-thirds exported to Brazil and Argentina.
98. According to the Notre Dame Climate Vulnerability Index (2024), Paraguay faces significant risks from climate change, ranking 75th out of 187 countries for vulnerability.
99. According to ESMAP (2020), average daily output above 4.5 kilowatt hours per installed kilowatt of capacity (kWh/kWp) provides "excellent" conditions for solar PV.
100. World Bank Group (2024).
101. Independent technical modeling of Paraguay's energy demand and supply confirm ANDE's conclusion of an emerging energy gap, even under more conservative assumptions. Pappis, I., Centurion, C., Ramos, E.P. et al (2021).
102. Electricity exports are projected to fall from 3.6 percent of GDP in 2023 to 2.5 percent of GDP in 2027 (IMF, 2024).
103. ANDE (2019).
104. See appendix B for a detailed description of modeling assumptions.
105. ANDE (2024).
106. ANDE (2023).
107. The LCOE is a measure of the average per unit (MwH) net present cost of building and operating an energy-generating asset over a project's lifetime, factoring in all the costs (capital, operations, maintenance, and fuel) and accounting for the time value of money. As such, it allows for the comparison of the cost of a kilowatt-hour produced using different generation technologies.

108. Includes the Weighted Average Cost of Capital (WACC). IRENA (2023) uses a WACC of 3.6 percent. The World Bank's Solar Atlas estimated an LCOE of 100 US$/MWh for Paraguay in 2018, using an operational lifetime of 25 years and a 10 percent WACC for all countries other than OECD and China.
109. IRENA (2022) and Lazard (2023). These prices do not include grid-related costs or other variable costs, such as taxes.
110. Art. 52 of Law 7021 introduces the concept of Value for Money, introducing additional criteria to price in public procurement. This concept is meant to account for additional benefits such as quality and sustainability. In the case of energy purchases, it could justify a premium relative to the minimum/ benchmark price to account for benefits such as reduction in losses (improved quality of service), however how these are to be valued is unclear.
111. To meet expected needs, the forthcoming 2024 transmission expansion plan requires US$3.24 billion to be invested in 216 projects over the next 10 years—including US$366 million in El Chaco region to support solar generation. (ANDE Master Transmission Plan 2021-2030)
112. Country and Sector Profiles. REDIEX. https://www.rediex.gov.py/en/por-que-invertir-en-paraguay/. Accessed Apr 2024.
113. September 2023 (CENIME)
114. https://www.skyquestt.com/report/textile-market#:~:text=Global%20Textile%20Market%20Insights,period%20(2024%2D2031).
115. Coherent Market Insights. https://www.coherentmarketinsights.com/industry-reports/global-fast-fashion-market. Accessed in July 2024.
116. Competitiveness Diagnostic Report Light Manufacturing in Paraguay, 2024
117. FPP is a manufacturing approach where the supplier manages everything from design to delivery. This includes creating designs, sourcing materials, manufacturing, quality control, finishing, and logistics. Key capabilities include skilled technicians, reliable suppliers, modern facilities, and efficient project and logistics management.
118. facilities designed to handle thousands of items per day
119. Navarro Villa, P. "Cotton Production Volume in Paraguay." *Statista*, 2024, www.statista.com/statistics/881838/paraguay-cotton-production-volume/. Accessed 28 May 2024.
120. Projections for 2024/25 at 54,431 tons, imply a 138 percent increase from the five-year average according to the United States Department of Agriculture (USDA).
121. The largest local payment processor has a quasi-monopoly on the payment system, which reduces competition for payment services.
122. According to the Multi-Dimensional Review of Paraguay. OECD, 2018, the skills that are most difficult to find are mainly related to emotional intelligence, communication

skills and critical thinking, all part of a group of generic, soft skills that are scarce among Paraguayan workers. Also, other more specific, technical skills related to budgeting, financial or computing skills are particularly in demand.

123. Multi-Dimensional Review of Paraguay. OECD, 2018.
124. "Measuring the Cost of Salaried Labor in Latin America and the Caribbean." IDB, 2017.
125. According to Competitiveness Market Study (2024), the wage for a seamstress in Paraguay is equivalent to US$360 per month, versus US$400 per month in Morocco, Africa's top textile exporter.
126. Law No. 7,143/2023 establishes the creation of the National Directorate of Tax Revenues (DNIT) in Paraguay as an autonomous and independent entity. This new institutional structure results from the merger of the Subsecretariat of State for Taxation (SET) and the National Customs Directorate (DNA), with the aim of optimizing the administration and oversight of tax and customs revenues in the country.
127. PARAGUAY: Una Visión Estratégica para el Fortalecimiento del Marco de Gobernanza Pública en Paraguay. IMF, 2021.
128. https://atb.nrel.gov/electricity/2024/utility-scale_pv-plus-battery.
129. https://exportpotential.intracen.org/en/products/tree-map?fromMarker=i&exporter=600&toMarker=w&market=w&whatMarker=k.
130. Export potential only considers the growth potential at the intensive margin. ITC's Product Diversification Index considers the growth potential at the extensive margin, which is beyond the scope of this methodology.
131. We refrain from estimating sectoral elasticities for two reasons. First, sectoral export and especially investment data are subject to measurement error, leading to biased elasticity estimates. Second, investment in one sector may spill over to exports in related sectors.
132. British Virgin Island, Cayman Islands, Guernsey, Jersey, Luxembourg, Bahamas, Bermuda, Marshall Islands, Curaçao, Gibraltar, Liberia, Barbados, Bahrain, Isle of Man, Nauru, Singapore, Vanuatu, Cyprus, Hong Kong SAR, Ireland, Malta and Panama.
133. This paper details UNCTAD's methodology to forecasting investment, which is used in its flagship reports, notably the Annual World Investment Report, the Global Investment Trends Monitor or the Investment Policy Reviews.
134. Following Vujanović et al. (2021), the control variables include the theoretically and empirically established determinants of FDI (Roman et al., 2016): imports and exports as a percentage of GDP, corporate taxes as a percentage of GDP, the US$/LCU exchange rate, and the simple average of a country's effectively applied tariff rate. All control variables are taken from the WB Development Indicators.
135. The validity of the model is verified by the diagnostic tests. The tests for first and

second order autocorrelation show that the instruments are related to the endogenous variables, but not to the error term. The instruments also appear to be exogenous, as confirmed by the Sargan and Hansen tests.

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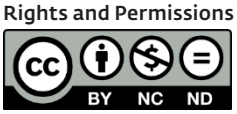

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