Energy diplomacy in Paraguay as a tool for the country's energy security

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Introduction

Energy diplomacy involves safeguarding energy security, which is linked to the security and development of a nation. Each country defines energy diplomacy according to its own resource conditions and national interests. Energy security, on the other hand, involves ensuring that countries can produce and use energy sustainably at a reasonable cost. This helps foster economic growth, development and reduces poverty. Furthermore, energy security must focus on improving people's well-being by expanding access to modern energy services, and must take into account the availability of resources in each country and level of economic development, in the case of Paraguay the comparative advantages in electric power (The World Bank Group, 2005).

Paraguay relies heavily on imported fossil fuels, especially in the transportation sector, without diversification of suppliers. The country still has a high dependence on the use of biomass in homes and industries and a low consumption of hydroelectric energy, which indicates a poorly diversified energy matrix that must be improved. The current energy policy seeks to guarantee energy security in a sustainable manner, promoting universal access to quality energy, taking advantage of national energy sources, reducing Paraguay's external dependence on fossil fuels. It also emphasizes the need to increase national added value and consolidate regional energy integration taking advantage of the country's central geographical location, all with a comprehensive and sustainable development approach based on socio-environmental responsibility ("Energy policy of the Republic of Paraguay". 2016). This paper analyzes Paraguay's recent energy policy, examining its role in achieving energy security through regional and international diplomacy.

Global context of the energy crisis and its impact at the national level

In the wake of the post-Covid global crisis, discussions were already beginning about the energy transition, however, what further fueled the debate about the global energy crisis was the geopolitical dispute surrounding the Russian-Ukrainian conflict that had a global impact and repercussions on national economies. Energy markets began to adjust within a few months of the start of the war, with gas and oil prices rising to historic levels that reached their

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highest level since 2008. It also had an impact on the increase in prices such as electricity and other energy resources (Global energy Crisis-Issues-IEA, n.d.).

This direct impact was reflected in the disposable income of households, affecting their purchasing power (Bobasu and Gareis, 2023). Energy poverty has deepened, and is manifested in the fact that citizens must reduce their consumption, but spend more on energy to be able to pay consumption bills, and there is also a greater risk of electricity supply cuts (Cong et al., 2022).

The evolution of energy policy in Paraguay

The first historical milestone for understanding energy policy in Paraguay is the creation of the entity in charge of coordinating the national electricity sector, the generation, transportation, distribution of electricity, the National Energy Administration (ANDE), created as an autonomous entity in 1964 (Historia De La Administración Nacional De Electricidad Ande, n.d.). Another significant moment was the signing of the international treaties for the hydroelectric use of the hydraulic resources of the international Parana River, signed in 1984 for the creation of the binational companies Itaipú and Yacyretá, with Brazil and Argentina respectively (Tratado de Itaipu, 1973). These two companies modified the Paraguayan energy reality, and also marked the beginning of electrical energy integration in South America.

A significant milestone in Paraguayan energy diplomacy was the Lugo-Lula Agreement signed in 2009. This agreement tripled Paraguay's electricity income from surplus energy ceded to Brazil from Itaipú and acknowledged Paraguay's right to receive a higher price for the energy transferred to Brazil from the hydroelectric dam (Biblioteca y Archivo Central del Congreso Nacional, 2013). The agreement not only allowed the development of the Paraguayan electrical system that was in an obsolete state, but also further favored regional energy integration and shortened the structural gaps between Paraguay and the countries of the Southern Common Market (“Mercosur ‘Structural Convergence Fund’ Has Distributed 1.1bn USD in 37 Projects,” 2011).

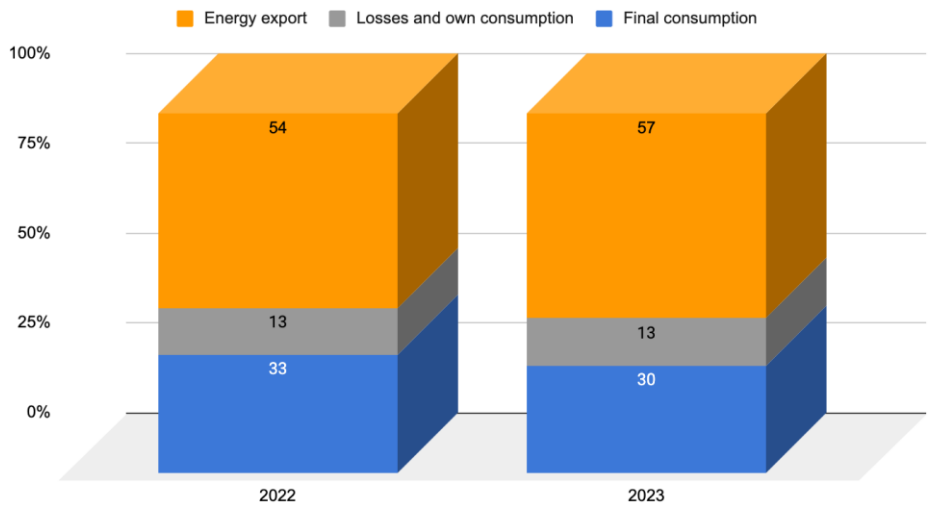
It took two governments after Fernando Lugo, the president of Paraguay (2008-2012), for the current National Energy Policy (2016) to be consolidated. This policy established strategic objectives to diversify the energy matrix in the electricity, bioenergy, hydrocarbons and other renewable energy with a view to improving energy security, universal access, reducing dependence on fossil fuels and strengthening regional integration (“Política Energética de la República del Paraguay,” 2016). Currently, this roadmap is in the stage of implementing projects that were complemented by the National Energy Agenda and its update

to short, medium and long-term plans until 2040 (“Plan Nacional de Desarrollo Paraguay 2030. Avances y Actualizaciones,” 2021).

The diversification of the energy matrix: Paraguay's energy dilemma

In 2022, Paraguay became the only country in the world with 100% renewable energy generation, as it is dominated by clean energy sources with one of the highest percentages in South America (Roca, 2022). Paraguay shares the Itaipu Hydroelectric Power Plant, administered with Brazil, which supplies 87.5% of the Paraguayan electricity market. And on the other hand, 8.4% of local demand is provided by the Yacyretá Hydroelectric Power Plant shared with Argentina. In both plants, 50% of the production corresponds to each country, but Paraguay sells the surplus energy to both countries (“Balance Energético Nacional 2023,” 2024, p.2).

Graph 1. Destination of the energy supply in percentage

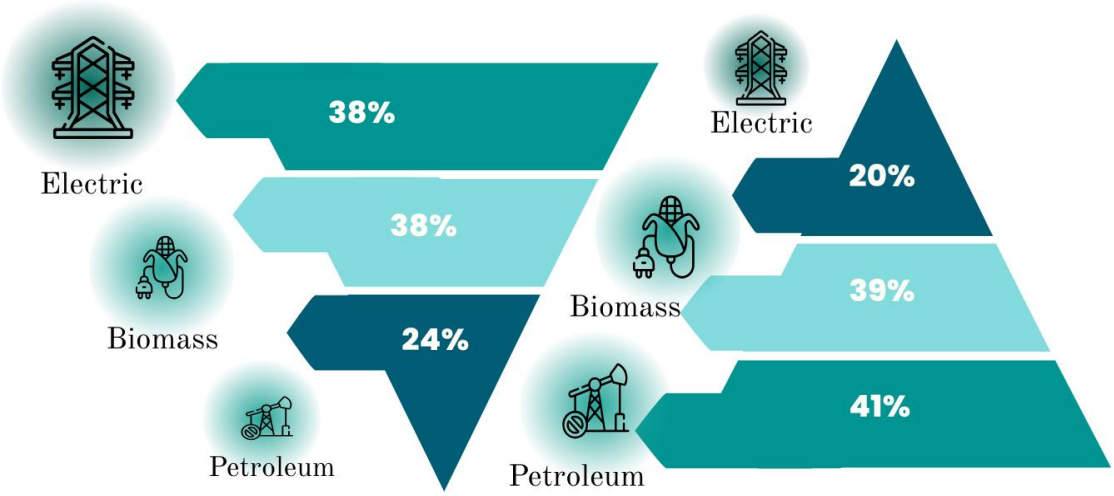


Source: VMME-MOPC elaboration based on the information sent by the companies of the electric sector.

Graph 1 shows the percentage of Paraguay's final consumption of electric energy. In 2022, 33% of the total energy was consumed domestically, while 54% was exported. By 2023, energy exports increased to 57%, reflecting a 3% rise compared to the previous year. Gross hydropower generation increased mainly due to the increase in available flow, which indicates the importance of the climatic factor with respect to the available flow of rivers, affecting hydroelectric generation (National Energy Balance 2023, 2024, p. 5).

Looking at the consumption structure of Paraguay's energy matrix, it is characterized by a strong participation of biomass, both for supply and demand; but also of petroleum products, especially in final consumption. The triangular figure clearly expresses the investment between the gross energy supply and the demand for final energy consumption in Paraguay (Balance Energético Nacional 2022, 2023). Figure 1 illustrates that despite Paraguay being a major producer of electrical energy (38%), the final consumption of electrical energy is only 20%. Oil ranks first in consumption, followed by biomass.

Figure 1. Energy supply and demand in Paraguay, 2022[2]



Source: Own elaboration from the National Energy Balance from 2008 to 2022. Vice Ministry of Mines and Energy of Paraguay.

Like other Latin American countries, Paraguay has a high dependence on imported fossil fuels that it does not produce in energy consumption. Paraguay's energy dilemma is that despite being a large exporter of electrical energy, it is still unable to balance the energy matrix to achieve greater security. It is necessary to transform and find balance in national energy consumption, and promote the use of electrical energy for national development and not only receive income from the surplus energy exported to other countries.

The opportunities and challenges of the energy sector in the country

Transboundary hydropower plants that Paraguay shares with its neighbors is the key that makes it possible to be a country where 100% of its energy is renewable. Paraguay's

[2] The content of the report corresponding to the year 2022 is prepared based on the information available on the closing date in the VMME-MOPC (July 31, 2023).

economic model and projection in the world has been based on the export of agricultural, forestry and livestock products in addition to the export of hydroelectric energy and commercial triangulation ("Plan Nacional De Desarrollo: Paraguay 2030," n.d.).

In addition to the lack of diversification of the energy matrix and the high dependence on oil and biomass, other factors influence Paraguay's energy security, such as the risks caused by climate change. Some climatic challenges include waves of drought, floods, extreme heat, forest fires and storms that have occurred in recent years (Ministerio de Vice Ministerio de Obras Públicas y Comunicaciones y Energía et al., 2019).

Another major risk related to national security is the management of sovereignty with neighbors over international rivers. Such was the case of the conflict generated between Paraguay and Argentina in September of last year over the collection of tolls on the Paraná-Paraguay waterway and the retention of river barges. This diplomatic crisis escalated to regional instances and Paraguay denounced the non-compliance with the rules of free circulation ("Lo más importante que tenés que saber sobre la tensión diplomática por la hidrovía Paraguay-Paraná," 2023).

There are also great opportunities in infrastructure such as the oceanic highway corridor megaproject that covers several countries in the region: Argentina, Brazil, Paraguay and Chile (BBC News Mundo, 2023). This project will have a positive impact on Paraguay since it will allow access to a new route for the movement of goods from the Atlantic to the Pacific (Ferreira, 2023).

Paraguay is also being considered an energy transit country. There are projects to build gas pipelines from Bolivia and Argentina to supply Brazil. Like other regional agreements in the field of electric energy, Paraguay is advancing in the alliance with Bolivia through the state oil production companies, Petróleos Paraguayos (Petropar)[3] and Bolivian Fiscal Oil Fields (YPFB)[4], for the supply of fuels, to diversify sources and not rely only on imports of Argentine gas ("Bolivia y Paraguay abordan el intercambio comercial de Hidrocarburos y Fertilizantes," 2024).

In addition to the extensive capacity and experience in the hydroelectric sector, Paraguay also becomes a favorable niche for investments that generate other types of energy, such as the production and export of ethanol and biodiesel, as well as biogas, solar energy,

[3] PETROPAR (Petróleos Paraguayos) is a Paraguayan state-owned hydrocarbon and gas import and distribution company. Petropar. (n.d.). INICIO. Petropar - Petróleos Paraguayos. https://www.petropar.gov.py/

[4] Yacimientos Petrolíferos Fiscales Bolivianos (YPFB) is a Bolivian state-owned enterprise dedicated to the exploration, exploitation, refining, industrialization, distribution and commercialization of oil, natural gas and derived products. Presentación. (2024, June 6). Ypfb. https://www.ypfb.gob.bo/es/

green hydrogen (Embajada de la República del Paraguay ante la República Francesa :: Paraguay como destino de inversiones, n.d.).

Conclusion

It is necessary to continue developing and accelerating the energy transition through public and private sector programs and projects in the field of alternative energies. The government of Paraguay aims to increase renewable energy consumption by 60% and reduce fossil fuel use by 20% by 2030 ("Plan Nacional de Desarrollo Paraguay 2030. Avances y Actualizaciones", 2021).

Paraguay has a high potential for hydroelectric energy, with 22 sites identified for small hydroelectric plants planned by ANDE ("Plan Maestro De Generación 2021 – 2040," 2023). In addition, other ventures such as pulp plants for bioenergy, biogas and green hydrogen are already underway.

However, there are challenges that need to be addressed in terms of environmental policy and climate actions, especially the lack of effective enforcement of environmental legislation to prevent deforestation and air, water and soil pollution (Paraguay | Interactive Country Sheets, s.f.).

Energy policy must incorporate technological development for an energy transition, taking into account financing through the creation of funds available for the energy industry, international cooperation and private capital. Opportunities such as the strategic alliance between the Ministry of Public Works and Communications of Paraguay and Korea, the Korea Environmental Technology and Industry Institute (KEITI), for sanitation and drinking water works to meet the goals of the Paris Agreement is a good practice (MOPC, 2017).

Energy diplomacy becomes a key tool for Paraguay, which must work to improve bilateral relations with its neighbors and position itself as an actor for regional energy integration. Paraguay has the great challenge of transforming hydroelectric revenues into national development, attracting investments for sustainable projects and promoting cooperation for the development of clean energy infrastructure for the world.

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