PARTICIPATION OF PRIVATE COMPANIES IN RENEWABLE ENERGY GENERATION IN URUGUAY

Uruguay's energy mix has undergone a profound transformation thanks to the active participation of the private sector across various renewable generation modalities. Below is a breakdown of the involvement of companies in each of the main segments:

Wind energy

The wind energy generation sector has been one of the most highly developed. Private participation is very diverse, including **large and small firms, both national and foreign**. These companies play multiple essential roles across the value chain.

The vast majority of these actors are members of the Uruguayan Renewable Energy Association (AUDER).

Biomass

Biomass represents a firm and predictable source of energy, with prominent participation from large companies and specialized consortia:

Cellulose mills: Companies such as **UPM** and **Montes del Plata** are the main players. Their plants are energetically self-sufficient and use wood residues and cooking liquor to generate electricity. Given their large capacities (160 MW and 180 MW, respectively), the surplus is sold to the grid. The new UPM2 plant, now fully operational, is projected to generate a surplus of more than 150 MW of firm energy.

Rice sector: Galofer S.A., a consortium of five rice mills, uses rice husk as fuel to generate electricity, with a capacity of 14 MW.

Forestry and wood sector: Electricity generation from wood biomass includes several firms that use sawmill byproducts and forestry residues:

Bioener S.A. generates electricity and steam from wood biomass in Rivera, feeding electricity into the grid and selling steam for industrial processes.

Timberland Investment Group (TIG) – Lumin operates a cogeneration plant fueled by industrial wood byproducts, selling the surplus to the grid.

Ponlar S.A. uses byproducts from a neighboring sawmill to generate steam and electricity (7.5 MW).

Energía Renovable Tacuarembó (Fenirol S.A.) generates energy from forestry residues and rice husk.

Liderdat S.A. (joint venture) produces energy from chips and sawdust for the sugar industry, selling the surplus.

ALUR (owned by ANCAP and PDVSA) participates in the electricity market by selling energy generated from bagasse, chips, and eucalyptus sawdust. It also produces biodiesel and bioethanol.

Lanas Trinidad S.A. uses biogas for power generation.

Solar energy

In this segment, private participation in solar farms is similarly broad, involving **large and small firms, both national and foreign.** As in the wind sector, companies perform multiple roles:

For a full list of energy-generating companies, it is recommended to consult the official source from the National Energy Directorate (DNE):

- **List of Participants/Generators in the Electricity Market:** https://adme.com.uy/mme_admin/participantes/generadores.php

INSTITUTIONAL AND REGULATORY FRAMEWORK

The success of the sector is partly due to the existence of an energy policy that sets direction, a solid institutional and regulatory framework that is attractive to investors.

Uruguay's 2005–2030 Energy Policy[1] has evolved into a State policy that establishes the main guidelines for the national energy sector with a long-term vision. It was approved by the Executive Branch in 2008 and ratified by a Parliament's Multiparty Energy Commission in 2010.

[1] See more information: 2005–2030 Energy Policy.

It is based on four components:

- Strategic guidelines, which define the major conceptual pillars of the energy policy.
- Targets to be met in the short term (five years), medium term (10–15 years), and long term (20 years and beyond).
- Lines of action needed to achieve the targets.
- Ongoing analysis of the energy situation in the country, the region, and the world.

The energy policy is committed to diversifying the energy mix, incorporating domestic sources in general, and renewable energy in particular. This commitment has several objectives, including achieving energy sovereignty, reducing costs, boosting the national energy industry, and reducing dependence on oil.

4.2.1. INSTITUTIONAL FRAMEWORK

Ministerio de Industria, Energía y Minería

An executing unit of the Ministry of Industry, Energy, and Mining (MIEM) is responsible for proposing and coordinating the national energy policy. Among its main duties are coordinating and guiding the actions of the actors operating in the energy sector and participating in the development of the normative and regulatory frameworks for energy-related activities.

Website: www.miem.gub.uy/energia

UTE La energía que nos une

The National Administration of Power Plants and Electrical Transmissions (UTE) is a state-owned company dedicated to the generation, transmission, distribution, and commercialization of electricity. Although a spot market exists, the vast majority of private energy generators sell the electricity they produce to UTE.

Website: www.ute.com.uy

ANCAP is a state-owned company that carries out various activities in the production markets for fuels, alcohol, and cement. To operate in these markets, it participates directly and as a shareholder (in many cases a majority shareholder) or owner of several companies active in some of these business lines. In the energy field, its activities related to natural gas and liquid fuels are particularly noteworthy. In the area of renewable energies, the company ALUR, a producer of biofuels, has ANCAP as its majority shareholder.

Website: www.ancap.com.uy

The sector's regulatory body is the Regulatory Unit for Energy and Water Services (URSEA), created as a decentralized entity under the Executive Branch, with oversight authority over the electricity, gas, and hydrocarbons markets in which the aforementioned public companies operate.

Website: www.ursea.gub.uy

The **Uruguayan Hydrogen Association** was established by the Uruguayan Renewable Energy Association, the Uruguayan Association of Private Energy Generators, the Uruguayan Construction Chamber, the Chamber of Industries, and the Uruguayan Logistics Chamber. It brings together different business and commercial groups involved in the various stages of the sector.

The Electricity Market Administration is a non-state public entity that manages the wholesale electricity market.

Website: www.adme.com.uy

The Commission for the Application of the Investment Law (COMAP) operates within the Ministry of Economy and Finance and aims to promote and protect investments made by national and foreign investors within the national territory.

Website: http://comap.mef.gub.uy

The Uruguayan Association of Private Energy Generators is a nonprofit civil association that brings together most of the private electricity generators located in Uruguay that have active contracts with UTE or interconnection agreements with

the National Interconnected System (SIN). It is composed of 28 companies with more than 1,000 MW of total installed generation capacity.

Website: www.augpee.org.uy

The Uruguayan Renewable Energy Association is a civil association dedicated to promoting, grouping companies or individuals, and supporting topics and projects related to the use of renewable energies as natural resource sources. It currently has nearly 100 active members, including developers, suppliers, consultants, and logistics operators.

Website: https://www.auder.org.uy

AUME

AUME: The Uruguayan Association of Women in Energy is an organized group of over 100 women from diverse professions linked to the energy sector.

Website: https://www.auder.org.uy/AUME.html

Other institutions and programs

Wind energy program in Uruguay	www.energiaeolica.gub.uy
Solar energy program in Uruguay	www.energiasolar.gub.uy
Probio Project	www.dne.probio.gub.uy
Biovalor Project	www.biovalor.gub.uy
Energy Efficiency Plan	www.eficienciaenergetica.gub.uy
Ministry of Environment	www.gub.uy/ministerio-ambiente
Private Sector Support Unit (UNASEP)	www.mef.gub.uy/unasep
National Climate Change Response System	www.cambioclimatico.gub.uy
National Agency for Research and Innovation (ANII)	www.anii.gub.uy
Technological Laboratory of Uruguay (LATU)	www.latu.org.uy
Solar Laboratory (LES) – University of the Republic	www.les.edu.uy
UTEC Uruguay – Renewable Energy Engineering	www.urtec.edu.uy
Pando Technology Park – R&D – Renewable Energies	www.polotecnologico.fq.edu.uy
Electric Mobility Roundtable	www.moves.gub.uy
UCU Energy Observatory	https://www.ucu.edu.uy/categoria/Observatorio-de-Energia-y-Desarrollo-Sus-401
Sectoral Energy Fund	https://www.anii.org.uy/apoyos/investigacion

4.2.2. REGULATORY FRAMEWORK OF THE ELECTRICAL SYSTEM

The Regulatory Unit for Energy and Water Services (URSEA) is the state institution that regulates, oversees, and advises on the generation, transmission, and distribution of electricity[2].

Law No. 16.832, the Electrical Regulatory Framework, approved in June 1997, establishes the freedom to generate electricity for any public or private entity. It also establishes that transmission and distribution (when wholly or partly intended for third-party use on a regular or permanent basis) remain under the responsibility of the state-owned company UTE.

General Investment Promotion Regime

Uruguay has had an active policy to promote investment in the country for decades. Law No. 16.906 (1998) declares the promotion and protection of national and foreign investments to be of national interest. A key feature is that foreign investors enjoy the same incentives as local investors: there is no tax-based discrimination and no restrictions on the transfer of profits abroad. Decrees No. 455/007, No. 002/012, No. 143/018, and No. 268/020 regulate this framework.

This regime grants investors tax benefits on corporate income and corporate equity. Investment projects covered under this regime and promoted by the Executive Branch may deduct between 30% and 100% of the invested amount from their IRAE (Corporate Income Tax) liability. The exempted tax amount cannot exceed 90% of the tax due[3]. The national IRAE flat rate is 25%. Additionally, there is an exemption from the wealth tax on movable fixed assets and civil works.

Specific Regimes for Renewable Energy

There is a regulatory framework aimed at developing the renewable energy sector, increasing private-sector participation in electricity generation, and boosting investments in the sector.

Decree No. 268/2020[4] of Law No. 16.906 grants tax incentives to investment projects declared to be promoted by the Executive Branch. Among the projects the law seeks to promote are those that meet targets related to the **use of clean technologies**. Other promoted targets include job creation,

[2] See the complete overview of the regulations governing the electricity sector (URSEA).

[3] For more information, see the Investor's Guide.

[4] https://www.impo.com.uy/bases/decretos/268-2020

decentralization, increased exports, growth in research, development and innovation (R&D&I), and specific sectoral indicators.

As of February 2022, green hydrogen was incorporated into the indicator matrix for COMAP projects in the MIEM sectoral category "Technological Level of the Manufactured Product." Investments will receive the maximum score for this indicator, qualifying as "High-Tech Manufacturing."

Meanwhile, **Decree No. 354 of 2009**[5] grants specific tax incentives for the renewable energy sector under Article 11 of the Investment Promotion and Protection Law.

Decree No. 23/014[6] establishes that investments made in wind-power generation projects connected to the National Interconnected System (SIN) are considered part of the intangible assets defined in Decree No. 02/012 at the moment the assets are transferred to UTE.

The purchase of electric vehicles is exempt from taxes. Fuel cell vehicles, in which the engine is fully electric, qualify for existing exemptions regarding the Global Tariff Rate and IMESI at the time of purchase.

Renewable Energy Certification System (SCER)[7]

Uruguay has a Renewable Energy Certification System based on blockchain. **This technology** facilitates traceability and ensures transparency for companies registered in the system, generating certificates linked to the use of renewable energy that they actually consume. Requesting the certificate has no cost for companies.

Solar Thermal Energy Law

The Solar Thermal Energy Promotion Law (**Law No. 18.585** of 2009) declares research, development, and training in the use of solar thermal energy to be of national interest. In this regard, investments in the manufacturing, implementation, and effective use of solar energy are included among the activities eligible for the exemptions set forth in Law No. 16.906 mentioned above. Additionally, the Executive Branch is authorized to grant full or partial exemption or reimbursement of Value Added Tax (VAT), Internal Specific Tax (IMESI), and customs duties on domestically manufactured or imported solar collectors that do not compete with national industry, as well as on domestic and imported goods and

[5] https://www.impo.com.uy/bases/decretos/354-2009/1
[6] https://www.impo.com.uy/bases/decretos/23-2014/2

[7] Access the Renewable Energy Certification System portal (link).

services, non-competitive with national industry, needed for their manufacturing. **Decree No. 451/011** regulates the benefits granted by the law and authorizes the sale of equipment exempt from local VAT. In addition, the law seeks to promote the adoption of this technology across various sectors in Uruguay by establishing mandatory incorporation in all new construction for high-consumption sectors such as hotels, healthcare centers, and sports clubs.

There are also UTE resolutions that finance and grant bonuses for the purchase of solar collectors for some housing cooperatives, allowing users to achieve between 15 and 20 years of net electricity savings. These two measures may serve as a strong incentive for companies involved in supplying inputs and equipment associated with solar generation.

Biofuels

Uruguay has a favorable regulatory framework for the production of biofuels since biodiesel and fuel-alcohol producers authorized by the Ministry of Industry, Energy and Mining can access an exemption from the Net Worth Tax on fixed assets, as well as a 100% exemption from Corporate Income Tax (IRAE, which is 25% in Uruguay) for a period of 10 years.

Law No. 19.924 (art.316), still pending regulation, extends the provisions of Law No. 18.195 (the Agrofuels Law) of November 14, 2007, for fuel alcohol and biodiesel, to **all renewable liquid fuels obtained either from agricultural raw materials or from the processing of industrial, agro-industrial, or urban solid waste.** The provisions cover the production, domestic marketing, and export of renewable liquid fuels made **with domestic or imported raw materials.**

Law No. 19.996, passed in November 2021, in Articles 182 to 184, makes the following amendments to Law No. 18.195 on agrofuels:

- It derogates Article 7, which required ANCAP to incorporate biodiesel (B100) produced in the country with domestic raw materials in a minimum mandatory proportion of 5% of the total volume of the blend between that product and automotive diesel marketed domestically.

- It instructs ANCAP to incorporate fuel alcohol produced in the country with domestic raw materials in a minimum proportion of 8.5% of the total volume of the blend between that product and automotive gasoline marketed domestically.

As a result of these amendments, the obligation to blend biodiesel is eliminated, and in the case of fuel alcohol, the mandatory minimum blend increases from 5% to 8.5%. These changes apply as of January 1, 2022.

Regulations: Law No. 17.567, Law No. 18.195, Law No. 19.289, Law No. 19.924, Decree No. 523/008 and Law No. 19.996.

Promotion of Microgeneration

Although microgeneration initially emerged in locations without access to supply from the traditional electricity grid, microgeneration solutions later began to be implemented as a complement to this supply source.

Decree No. 173/010[8] authorizes subscribers connected to the low-voltage distribution grid to install renewable generation, wind, solar, biomass, or small hydro, provided certain requirements related to installed capacity are met.

The decree tasked the Ministry of Industry, Energy and Mining (MIEM) with approving the general conditions governing bidirectional exchanges between the microgenerator and the distributor. Initially, the conditions established by MIEM stipulated that UTE would purchase all energy injected into the grid at the same price set in the tariff schedule. The **Ministerial Resolution of May 12, 2017**[9] introduced a requirement regarding the energy balance between the energy generated by the microgeneration plant and the consumption of the microgenerating user, with the aim of preventing installations whose main purpose is not self-consumption. The resolution applies to microgeneration projects submitted after its issuance.

Self-Consumption of Electricity

The generation of electricity for self-consumption without the possibility of injecting surplus into the grid—isolated plants or plants connected to the grid but not injecting energy—is regulated by **Decrees No. 43/015** and **No. 114/014**. Installed capacities under 150 kW do not require MIEM authorization, although prior registration is mandatory, while capacities above that threshold must obtain specific authorization from MIEM's National Directorate of Energy. If public-domain hydraulic resources are used, a water-use authorization is also required.

[8] https://www.impo.com.uy/bases/decretos/173-2010
[9] Resolution of May 12, 2017, MIEM

All generation plants must install a meter that records the energy produced, and monthly records must be submitted to the National Directorate of Energy (DNE) for energy balance purposes. If public-domain hydraulic resources are used, a water-use concession is also required.

Energy Efficiency

The National Energy Efficiency Plan is regulated by Law No. 18.597, approved in 2009. This law establishes the implementation and expansion of various workstreams to promote energy efficiency, as well as the appropriate financial mechanisms to foster the efficient use of energy in the country[10].

More information on sector regulations can be found at the following link: DNE-Regulations

Benefits for Companies Intensive in Electricity Use

As a way of leveraging the energy mix to consolidate industrial development, UTE offers favorable tariffs for companies intensive in electricity use. The most recent call to apply for the benefit was carried out through Decree No. 118/017, which established an application period between May and June 2017. To access the benefits, companies had to have annual electricity expenditures with UTE equal to or greater than 2.5% of their annual gross production value (GPV) and at least one year of operation. The benefit provided to companies is tied to maintaining or increasing physical production and consists of a monthly discount on the energy charge, excluding VAT.

In the first edition (2015–2016), the measure resulted in increased industrial production, reflected in an US$11 million rise in gross production value among the 24 companies that applied, along with increased employment, revenue, tax contributions, and spillover effects on the national economy. In the 2017 edition, 92 electro-intensive industries applied.

Tariff Discounts for the Productive Sector

Generation costs have already decreased due to changes in the country's energy mix, and measures are being implemented to pass this reduction on to the productive sector.

In May 2017, UTE announced a commercial benefits program for dairy producers and companies or production units within the dairy value chain. The benefit consists of a monthly discount on the energy charge before VAT and is implemented across four levels depending on the characteristics of the beneficiaries. Tariff discounts applied between June and December 2017.

[10] http://www.eficienciaenergetica.gub.uy/marco-legal

Another measure implemented was the pilot plan "Opportunity Offer," which introduced multi-hour tariffs for companies. This mechanism operates through UTE's establishment of time-differentiated tariffs with discounts of up to 40%, depending on the surplus energy available from the state-owned utility. The special tariff applies to consumption exceeding the average consumption level, according to the selected time band.

4.3. AVAILABLE RENEWABLE ENERGY SOURCES

Uruguay has natural resources that enable the development of renewable energy. High water flow, constant and predictable winds, uniform solar irradiation across the territory (with seasonal variation), and a strong agro-industrial sector create opportunities for biomass use.

What Are Renewable Energies?

Renewable energy refers to energy that comes from virtually inexhaustible sources, either because of the vast amount of energy they contain or because they can regenerate naturally. The main renewable energy sources include solar energy, wind energy, hydropower, tidal energy (generated from tides), geothermal energy (derived from heat inside the Earth), and biomass. Renewable energies are defined in contrast to non-renewables, which are found in limited quantities in nature.

4.3.1. HYDROPOWER

Hydropower generation in Uruguay is the main source of electricity. The hydropower generation complex consists of three cascading plants on the Negro River: Gabriel Terra (Rincón del Bonete), with an installed capacity of 152 MW; Baygorria, with 108 MW, and Constitución (Palmar), with 333 MW; as well as one binational plant on the Uruguay River (Salto Grande), with a total capacity of 1,890 MW, of which 945 MW correspond to Uruguay and the rest to Argentina.

In 2024, Salto Grande generated 59% of hydropower, Palmar 24%, Gabriel Terra 11%, and Baygorria 6%. Currently, large-scale hydropower development in Uruguay is near its maximum limit. Nonetheless, there is additional potential for the installation of small hydro plants (SHP), which could eventually become an additional source of supply.

4.3.2. WIND ENERGY

In recent years, wind energy has become more reliable and has penetrated the electricity systems of many countries. Uruguay has followed the international trend and has embarked on a wind energy

development program with strong investments that have allowed it to take advantage of the abundant resource available.

The country's topographic characteristics, vast plains with almost no obstacles, ensure constant and predictable wind availability[11]. To date, all wind generation capacity development and expansion has taken place on land. Meanwhile, ANCAP has developed the H2U Offshore program to promote the production of green hydrogen and its derivatives through the installation of offshore wind farms on Uruguay's continental shelf.

TABLE No. 2 PRIVATE WIND ENERGY GENERATORS

Generator	Generating Agent	Primary Source	Installed Capacity
PERALTA I GCEE	AGUA LEGUAS S.A.	Wind	58.75 MW
PERALTA II GCEE	AGUA LEGUAS S.A.	Wind	58.75 MW
TALAS DEL MACIEL I	ASTIDEY S.A.	Wind	50 MW
TALAS DEL MACIEL II	CADONAL S.A.	Wind	50 MW
CORFRISA	CORPORACIÓN FRIGORÍFICA DEL URUGUAY	Wind	1.8 MW
ENGRAW	ENGRAW EXPORT & IMPORT CO. S.A.	Wind	3.6 MW
MELOWIND	ESTRELLADA S.A.	Wind	50 MW
PARQUE EÓLICO CARAPÉ I	FINGANO S.A.	Wind	51 MW
MINAS I	GENERACIÓN EÓLICA MINAS S.A. - GEMSA	Wind	42 MW
PARQUE EÓLICO FLORIDA II	GLYMONT S.A.	Wind	49.5 MW
PARQUE EÓLICO 18 DE JULIO	IKEROL COMPANY S.A.	Wind	10 MW
PARQUE EÓLICO JULIETA	IWERYL S.A.	Wind	3.6 MW
PARQUE EÓLICO MAGDALENA	KENTILUX S.A.	Wind	17.2 MW
PARQUE CERRO GRANDE	LADANER S.A.	Wind	50 MW
LUZ DE LOMA	LUZ DE LOMA S.A.	Wind	20 MW
LUZ DE MAR	LUZ DE MAR S.A.	Wind	18 MW
LUZ DE RÍO	LUZ DE RÍO S.A.	Wind	50 MW
MARYSTAY	MARYSTAY S.A.	Wind	2 MW
PALOMAS	NICEFIELD S.A.	Wind	70 MW

[11] A survey carried out in 2009 by MIEM and the School of Engineering of the University of the Republic enabled the creation of a national wind map: Uruguay's Wind Energy Program (PEEU).

PARQUE EÓLICO LOMA ALTA - CENTRAL 1	NUEVO MANANTIAL S.A.	Wind	14 MW
NUEVO MANANTIAL CENTRAL 2	NUEVO MANANTIAL S.A.	Wind	4 MW
CUCHILLA DEL PERALTA I	PALMATIR S.A.	Wind	50 MW
PARQUE EÓLICO KIYÚ	PARQUE EÓLICO KIYÚ S.A.	Wind	49.2 MW
PARQUE EÓLICO FLORIDA I	POLESINE S.A.	Wind	50 MW
PARQUE EÓLICO SOLÍS DE MATAOJO	POSADAS & VECINO S.A.	Wind	10 MW
PARQUE EÓLICO MALDONADO II	R DEL ESTE S.A.	Wind	50 MW
PARQUE EÓLICO MALDONADO	R DEL SUR S.A.	Wind	50 MW
PARQUE EÓLICO VENTUS I	República Administradora de Fondos de Inversión S.A.	Wind	9 MW
PARQUE EÓLICO VILLA RODRÍGUEZ	TOGELY COMPANY S.A.	Wind	10 MW
PARQUE EÓLICO LIBERTAD	TOGELY COMPANY S.A.	Wind	7.7 MW
PARQUE EÓLICO ROSARIO	TOGELY COMPANY S.A.	Wind	9 MW
PARQUE EÓLICO MARÍA LUZ	TOGELY COMPANY S.A.	Wind	9.75 MW
PARQUE EÓLICO CARAPÉ II	VENGANO S.A.	Wind	40 MW
PARQUE EÓLICO NUEVO PASTORALE I	VIENTOS DE PASTORALE S.A.	Wind	52.8 MW

Source: prepared by Uruguay XXI based on UTE data.

4.3.3. SOLAR

Uruguay is located within a geographic latitude range from 30º 04' to 34º 53'. The average annual daily global horizontal irradiation across Uruguayan territory is 4.6 kWh/m². The Solar Energy Laboratory[12] (LES) of the University of the Republic (UdelaR) has highly detailed information on the geographic and temporal characterization of the solar resource.

In recent years, the installed capacity of large-scale solar photovoltaic farms has increased significantly, as has the installation of small- and medium-scale systems. With regard to solar thermal systems, these have also experienced substantial development in Uruguay over the past few years, increasing from 50,000 m² in 2014 to nearly 100,000 m² (according to the 2020 National Energy Balance-BEN).

TABLE No. 3 PRIVATE SOLAR ENERGY GENERATORS

[12] Solar Energy Laboratory.

Generator	Generating Agent	Primary Source	Installed Capacity
ALTO CIELO	ALTO CIELO S.A.	Solar Photovoltaic	20 MW
CASALKO	CASALKO S.A.	Solar Photovoltaic	1.76 MW
TS	CERNERAL S.A.	Solar Photovoltaic	1 MW
EL NARANJAL	COLIDIM S.A.	Solar Photovoltaic	50 MW
DICANO	DICANO S.A.	Solar Photovoltaic	11.25 MW
FENIMA	FENIMA S.A.	Solar Photovoltaic	9.5 MW
ARAPEY SOLAR	GIACOTE S.A.	Solar Photovoltaic	10 MW
MENAFRA SOLAR	GIACOTE S.A.	Solar Photovoltaic	20 MW
ABRIL	GILPYN S.A.	Solar Photovoltaic	1 MW
LA JACINTA	JACINTA SOLAR FARM S.R.L.	Solar Photovoltaic	50 MW
DEL LITORAL	JOLIPARK S.A.	Solar Photovoltaic	16 MW
NATELU	NATELU S.A.	Solar Photovoltaic	9.5 MW
PETILCORAN	PETILCORAN S. A.	Solar Photovoltaic	9.5 MW
RADITON	RADITON S.A.	Solar Photovoltaic	8 MW
VINGANO	VINGANO S.A.	Solar Photovoltaic	1 MW
YARNEL	YARNEL S.A.	Solar Photovoltaic	9.5 MW

Source: prepared by Uruguay XXI based on UTE data.

4.3.4. BIOMASS

Biomass is described as “any organic material that can be used for energy purposes”. This concept includes woody and herbaceous products and by-products, as well as certain industrial and municipal waste. In recent years, Uruguay has undergone significant changes in its agricultural sector, with a strong expansion in the production of crops such as soybeans, rice, and wheat.

Likewise, forestry in Uruguay has expanded considerably, reaching almost one million hectares of planted forests, which has enabled the development of wood mechanical processing industries. The development of energy production from non-traditional biomass occurred in this context of growth within the forestry sector, along with the cellulose industry and under a State energy policy that includes the promotion of renewable energy among its objectives. The advantages of biomass as an energy source are mainly linked to its potential management capacity and its ability to act as a backup for the electrical system.

TABLE No. 4 PRIVATE BIOMASS GENERATORS

Generator	Generating Agent	Primary Source	Installed Capacity
ALUR	**ALCOHOLES DEL URUGUAY S.A.**	**Biomass**	**10 MW**
BIOENER	BIOENER S.A.	Biomass	12 MW
MONTES DEL PLATA	**CELULOSA Y ENERGIA PUNTA PEREIRA S.A.**	**Biomass**	**180 MW**
FENIROL	FENIROL S.A.	Biomass	10 MW
GALOFER	**GALOFER S.A.**	**Biomass**	**14 MW**
ARBORETO	LANAS TRINIDAD S.A.	Biomass	0.6 MW
LIDERDAT	**LIDERDAT S.A.**	**Biomass**	**5 MW**
PONLAR	PONLAR S.A.	Biomass	7.5 MW
URUPLY	**URUPLY S.A.**	**Biomass**	**12 MW**
UPM	UPM	Biomass / Fuel Oil	161 MW
UPM 2	UPM	Biomass	310 MW

On the other hand, major efforts have been made by the public sector to analyze the country's potential for generating this type of energy. Examples of this include completed projects such as PROBIO and BIOVALOR.

4.3.5. FORESTRY RESIDUES

In recent years, projects for electricity generation from forestry and agricultural residues have been developed in the country, driven by bidding processes that promoted investment. Uruguay has a high percentage of wood destined for industrial processing, which creates significant potential to valorize the by-products of the wood mechanical processing chain, one of the main sources of biogenic CO_2 in this context[13].

Operations within the forestry industry produce large amounts of residues at different stages. There is interest in encouraging the production of various biochemical products, biomaterials, and advanced biofuels. Uruguay currently holds the status of a country with policies geared toward the bioeconomy and is committed to a diversified, higher value-added transformation of the forestry sector.

4.3.6. AGRICULTURAL AND LIVESTOCK RESIDUES

Several experiences with electricity generation from other agricultural residues currently exist, although these resources are considered underutilized. One of the first such sources used in the country was rice

[13] Availability of CO_2 for the production of green hydrogen derivatives in Uruguay (link).

husk. There are currently two ventures processing this residue, as well as one initiative using sugarcane bagasse.

Regarding residues generated by livestock activities, there are also experiences with biogas production through anaerobic digestion in the dairy and wool sectors.

4.3.7. LIQUID BIOFUELS

Uruguay, being an important agricultural producer, has suitable conditions for producing liquid biofuels from biomass. Production of bioethanol and biodiesel has increased over the last decade. In 2020, the biomass supply for biofuel production represented 2% of the total energy supply. These biofuels were produced exclusively from national raw materials, as established by the Agrofuels Law (Law No. 18.195).

ALUR S.A. (90.79% owned by Ancap) is the country's main agrofuel producer. It has a bioethanol production capacity of 92,200 m^3/year, primarily supplied to Ancap, where it is blended with gasoline at an approximate rate of 10%. It also has an annual production capacity of 50,000 tons/year of biodiesel, mainly supplied to Ancap for blending at approximately 5% with diesel. The company has also managed to export its products to international markets.

Ancap has launched an initiative to take advantage of existing biomass resources under the obligations set by Article 67 of the Forestry Law (Law No. 15.939). To this end, it created a second-generation biofuels research center (CIDEB) together with the Latitud Foundation of the Technological Laboratory of Uruguay (LATU), using lignocellulosic residues. Additionally, the ANCAP Group has opened a call for companies interested in developing biofuels in Uruguay. This initiative seeks to promote the production and use of cleaner energy in the country. Selected companies will collaborate with ANCAP on projects that foster sustainability and energy diversification[14].

4.3.8.URBAN WASTE

The use of urban solid waste for energy production is an increasingly common mechanism worldwide as a way to mitigate pollution generated by large urban centers. Uruguay does not have medium- or large-scale plants for converting urban waste into energy, beyond pilot projects carried out by some municipalities.

The treatment and final disposal of urban waste is the responsibility of each of the country's 19 departmental governments. According to available studies, it is estimated that urban solid waste

[14] link

disposed of in the main Final Disposal Sites totals 1,100,000 tons/year, of which 780,000 come from Montevideo.

National and local authorities consider waste valorization through energy production a necessary action and are interested in developing projects of this type that cover multiple urban centers, acknowledging that opportunities exist for private-sector participation.

In September 2019, the Waste Management Law was approved[15]. The law aims to serve as a regulatory framework for waste management, with clear guidelines aligned with the environmental policy. The law is based on a sustainable development model, promoting waste revalorization and fostering new forms of business and employment. This law falls under the National Waste Management Plan, a national-level strategic planning tool aimed at improving waste management as part of the transition toward a more circular Uruguay.

[15] Waste Management Law