

Second Energy Transition for Uruguay

BY ERNESTO ELEENTER

Uruguay has proven in its first energy transition (2010-2020) that it has achieved a 97% renewable energy share and is among the top 2 in the world in terms of wind energy share. The country is currently outlining its second energy transition to decarbonize transportation, harness the vast renewable resources available, while solving the problem of high electricity and fuels prices that the country still faces.

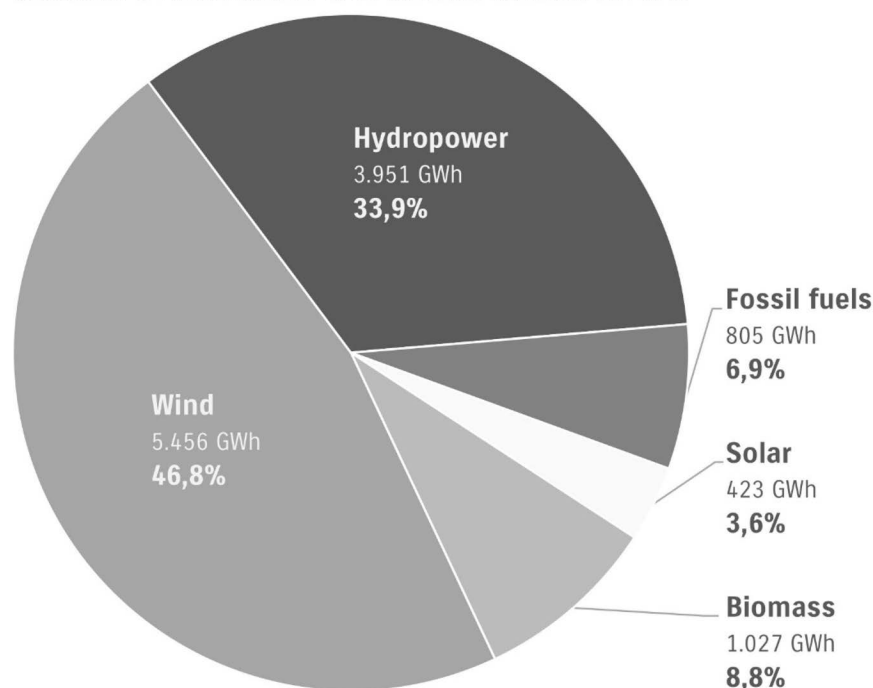
1.- Uruguay's first energy transition

Uruguay is a small South America country with 3.5 million inhabitants, whose main economic activity is agriculture and livestock.

Since the country does not have fossil resources (there is no oil, coal or natural gas), it has to import oil and natural gas to meet its demand, with oil being the main import.

However, the country has abundant renewable resources, with biomass and hydropower being the traditional sources that have historically met much of the national demand. Since 2012, Uruguay has made an amazing transformation of its electricity sector, incorporating more than 1,500 MW of wind energy, and about 300 MW of photovoltaic solar energy. Considering that the maximum demand was 2,200 MW and the average demand of the country is barely 1,200 MW, it is easy to understand that wind energy is already the main source of energy in the country.

URUGUAY'S ELECTRICITY GENERATION MATRIX IN 2020



Source: Prepared by SEG Ingeniería based on data from "Histórico de la Composición Energética por Fuente", Administración Nacional de Usinas y Transmisiones Eléctricas (UTE, portal.ute.com.uy), September 2021.

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A recent world ranking shows Uruguay as the 2nd country with the highest penetration of unconventional renewable energy in the world after Denmark.

With these changes, the electricity system went from a hydrothermal system to one based on hydro and wind, with relevant contributions from biomass and solar, while thermal generation from fossil fuels represents only 2% or 3% of the electricity matrix (except in drought years, when it can represent around 7%).

In addition to the environmental and macroeconomic benefits (improving the balance of trade by reducing oil imports), the electricity sector went from a situation of supply shortage (with supply risks in drought years and very high marginal costs) to being a country exporting electricity to neighboring Brazil and Argentina.

This transformation took place without subsidies and based on public auctions with PPA's at 20 years (wind) or 30 years (solar), which also determined a significant reduction in generation costs and the reduction of the country's vulnerability to climatic factors.

2.- Uruguay is planning its second energy transition.

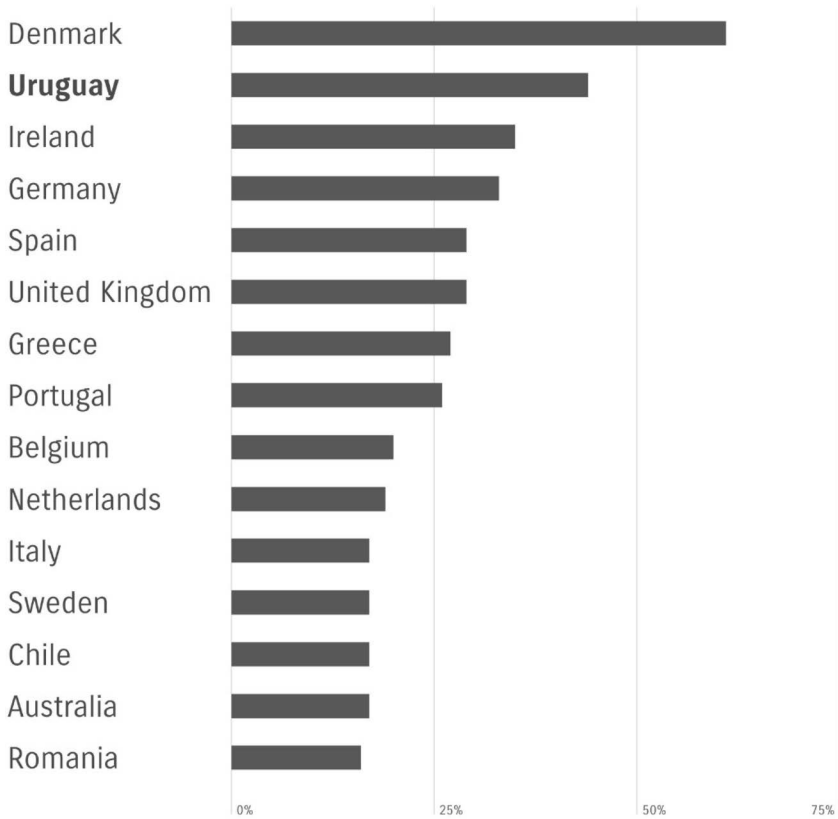
Based on the experience gained and the abundance of renewable resources, Uruguay plans to carry out its second energy transition.

Although Uruguay is a country with the mentality of a "small country", used to following the lead of other, more advanced countries, the energy revolution achieved in the last decade has generated enthusiasm and a level of self-confidence among stakeholders in the sector, that allows it to enter this new phase with optimism and confidence.

In addition to contributing to the reduction of emissions, many other benefits can be expected from this second transformation. On the one hand, attracting billions of dollars of investment will create quality jobs that are in line with the sustainable development goals, and on the other hand, continuing on the path of substituting fossil fuels with domestic sources will bring many other macroeconomic benefits to the country.

From the point of view of GHG emissions, the power sector is not relevant. However, the transport sector is responsible for 2/3 of Uruguay's

TOP 15 WIND AND SOLAR ELECTRICITY PRODUCTION RATIOS IN 2020



Source: Prepared by SEG Ingeniería based on data from "Top 15 Wind and Solar Power Countries in 2020", EMBER, July 2021.

In addition to electric mobility, the country is preparing to incorporate new technologies to make the most of the potential of renewable energies, among which the following stand out:

Energy storage: based on lithium batteries, behind the meter or in front of the meter, this will help reduce the use of fossil fuel power plants during peak periods when there is little wind or sun.

Demand management: several mechanisms are being explored to make demand more flexible. The high percentage of "Smart meters" already installed by the state utility company stands out.

Green hydrogen: the government is beginning to develop its green hydrogen roadmap, while also launching a pilot project to incorporate an H2 generation system to be used in a fleet of heavy-duty renewable trucks.

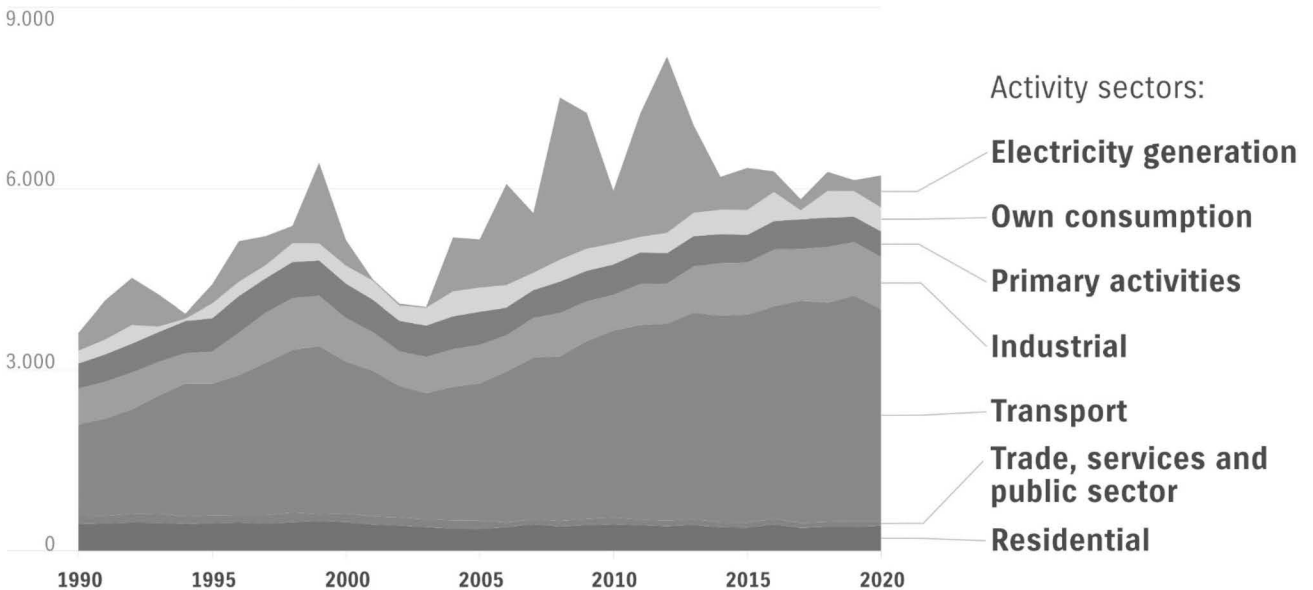
Heat Pumps: they have enormous potential to replace fossil fuels with green power. For both residential heating and some industrial applications, heat pumps will be a very efficient way to use electricity as a green source to generate thermal energy.

emissions. Therefore, electric mobility is imposed as the main protagonist in this new phase.

The country has already put in place some incentive mechanisms to promote electric mobility. A small part of the taxi and bus fleet is electric, but more profound changes are needed to achieve a real transformation of the current fleet, which remains mainly running on petrol or diesel.

Power to X: at the industrial level, this option is indicated to convert electricity into thermal energy (electric steam boilers or hot water) during periods of electricity surplus. There is also much potential to produce green hydrogen or hydrogen derivatives (e. g. ammonia), which can be exported mainly to Germany, a country

URUGUAY'S TOTAL CO₂ EMISSIONS IN THE LAST 30 YEARS



Source: Prepared by SEG Ingeniería based on data from "Balance Energético Nacional 2020", Ministerio de Industria, Energía y Minería, September 2021.

developing a diversified green hydrogen import strategy.

3.- Challenges

On the one hand, the success of the first energy transition, which was mainly based on the use of wind energy, was unexpected, since by that time the cost of this technology had already dropped dramatically. On the other hand, Uruguay was behind in its investments in electricity generation, so there was a real urgency to install new power stations.

The dilemma was to rely more on fossils or on unconventional renewables, although they had almost no experience with this technology and also did not have much experience worldwide in using these technologies with high penetration rates of intermittent energies (wind or solar) in a system. Uruguay accepted

the challenge and took some risks, which in retrospect turned out to be the best strategic decision.

In this new phase, Uruguay can once again take the leap to its second energy revolution and create the necessary mechanisms to incorporate these technologies. The big question is whether the country will have the same courage to plunge into this new challenge, given the risks involved.

At the same time, Uruguay should achieve a reduction in energy prices both for companies and for the population in general.

Uruguay has the highest petrol and diesel prices in Latin America, and electricity rates are also among the highest, especially for the residential sector.

Therefore, the challenge for the country seems to be even more complex, as not only is the conversion of a relevant part of the energy demand side required, but creativity is also needed to reduce tariffs for customers.



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The banner features a blue and orange color scheme. On the left, there is a stylized blue graphic of a classical building (the Parthenon) with a network of white lines overlaid on it. Below this, there are silhouettes of various classical Greek buildings. On the right, a large orange circle is partially visible, representing a sun or moon. The text is arranged in a clean, modern layout.