ANCAP

Uruguay – The Ideal Partner for Green Hydrogen Demonstration Projects

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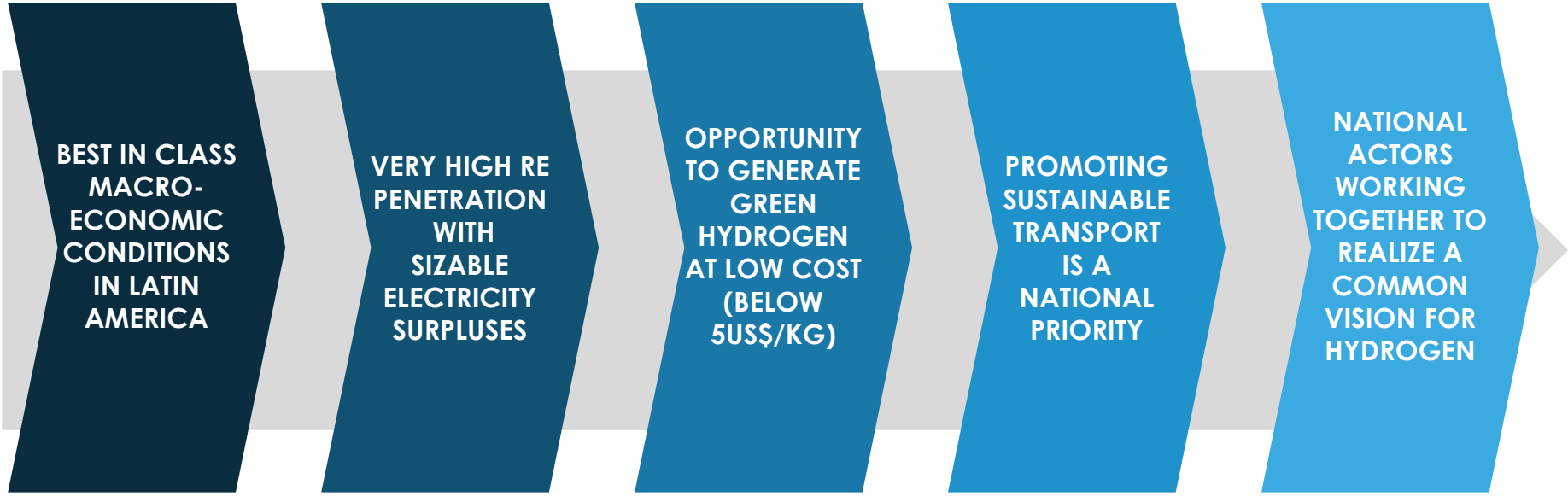
5 Key Reasons for investing in green hydrogen in Uruguay

5 key reasons for developing hydrogen demonstration projects in Uruguay



REASON 1 – URUGUAY HAS BEST IN CLASS MACROECONOMIC CONDITIONS IN THE REGION

Supported by excellent social and political stability, a robust democratic system, and a high transparency index, Uruguay is a safe bet for foreign investors, specially when compared to other countries in the region.

Strong macroeconomic indicators earn Uruguay investment grade (BBB) and a stable outlook, which gives it access to low interest international resources.

Uruguay holds an enviable position within the region for foreign investment

- Among all Latin American countries, Uruguay ranks first both in prosperity and transparency indexes
- It also enjoys solid political and economic stability, supported by a robust democracy
- Being part of Mercosur, Uruguay has ease of trade across borders to Brazil, Argentina and Paraguay
- Uruguay has enjoyed steady growth in GDP, averaging 4.27% between 2007 and 2017
- During the last decade it was the second country receiving Foreign Direct Investment (FDI) in relation to GDP (5.3%) [6]
- The country has a Law on the Promotion and Protection of Investments that establishes that foreign investment receives the same treatment as national ones
- In 2016, Uruguay ranked 3rd in the world in relation to the level of investment in renewable energy as a percentage of GDP [6]
- Uruguayan engineering is amongst the best in the region, and offers world-class competitive services

The country has a wide range of options for financing energy and infrastructure projects

- **Banking finance,** either through foreign banks with presence in the country, or through the state bank (Bank of the Oriental Republic of Uruguay - BROU - which has already financed wind energy projects)
- **Infrastructure funds;** in 2017, a US $ 350 million fund was structured through a trust managed by CAF, which contributes 10% of the financing for public projects with involvement of the private sector. [6]
- **Multilateral organization funding,** which channel foreign resources for the development of the country. The IDB, the World Bank, and the CAF have an active presence in Uruguay
- **Resources from the Pension Savings Fund Administrators (AFAPs),** who invest in long-term assets and have already participated in wind farms.
- **Local investors;** in Uruguay private sector investments are channeled through negotiable obligations or trusts, in a well organized market
- **Since 2010, investments in the renewable energy sector in Uruguay have exceeded 7 billion USD.**

Uruguay positions itself as a regional leader in innovative green technology by 2030

- Uruguay is part of the **UN's Partnership for Action on Green Economy**. It is committed to implement a strategy to include green growth practices and policies in key sectors to ensure green, sustainable and resource efficient development in accordance to the UN 2030 goals.
- Has an established **National Strategic Plan for Science, Technology and Innovation (2010-2030)** with the objective of increasing its technological competitiveness in the international sphere. One of the identified sectors for prioritizing is the energy sector.
- By leveraging on these two objectives, **Uruguay positions itself as the best partner for the implementation of innovative green technology pilots and projects in the region.**
- Furthermore, **Uruguay has a remarkable multi-party approved State Energy Policy with horizon 2030**, approved in 2010, that is set to position Uruguay as a regional leader in clean generation and sustainable energy use

REASON 2 – HIGHLY DEVELOPED RENEWABLE ENERGY SECTOR AND SIZABLE ELECTRICITY SURPLUSES

Uruguay generates around 98% of its electricity from renewable sources. Wind, solar photovoltaic and biomass energies have steadily increased their share in the local matrix and will continue to do so. As a result, it's energy matrix is frequently quoted as a global example of accelerated decarbonization,

The surplus electricity of the Uruguayan energy system is currently of significant magnitude (2 TWh per year on average), with about half of it being exported to Brazil and Argentina.

Hydrogen for transportation and industry is therefore a viable alternative to generate revenues from surpluses and reduce curtailment.

Uruguay has an exceptionally clean energy matrix, in which hydrogen can be easily integrated

- Uruguay has highly favorable conditions for renewables, with high capacity factors: 40% for wind, 20% for solar.
- The State Energy Policy made a strong commitment to renewable energies, with ambitious goals in the short term, promotion laws and tax incentives.
- The electricity matrix is 98 % renewable (in 2017 52% hydro, 26% wind, 18% biomass, 2% fossil).
- Wind, solar and biomass long-term PPA agreements are commonplace and embraced by the market. The success of PPA's is partially responsible for increasing wind capacity from 0 to 1,500 MW in five years, and solar from 0 to 260MW in the same time
- Thus, Uruguay can be classified as a country where the energy transition (from the generation side) has already occurred, and where new opportunities are arising from the end-use side
- World Economic Forum's Energy Transition Index 2019 places Uruguay in the top 10% percentile of high performers.

The integration of unconventional renewables to the grid will increase surplus electricity

- Between 2019 and 2030, the surplus electricity of the Uruguayan system will be, on average, of 2 TWh per year [4]
  - About 18 % of total generation.
  - About half of it is exported to neighboring Argentina and Brazil.
  - Using just 10% of the 2 Terawatt-hours of surplus electricity, with a reference electrolyzer plus compression consumption of about 57 kWh/kg, Uruguay could produce 10 tons of hydrogen per day, enough to supply a fleet of 300 urban fuel cell buses.
- Uruguay is starting to analyze an ecosystem that fosters internal hydrogen use for transport and industry.
- In the long term, a hydrogen economy based on renewables needs large storage capacity. ANCAP Exploration and Production Department is currently studying the geological storage of hydrogen in the saline aquifers of the Santa Lucia basin onshore Uruguay, leveraging on a previous study for natural gas storage.

REASON 3 – URUGUAYAN GREEN HYDROGEN CAN BE COST COMPETITIVE, BOTH INSIDE AND OUTSIDE THE COUNTRY

Hydrogen produced in Uruguay can be cost competitive with fuels for internal use, or can be exported to create a sizable revenue stream.

Given the ease of access to coasts and ports in Uruguay, good road infrastructure, and complete coverage of the electricity system, Uruguay can position itself as a potential exporter of green hydrogen to overseas markets.

Preliminary analysis reveals that hydrogen produced in Uruguay can have a competitive price

In Uruguay, there are multiple technically feasible options to produce green and grey hydrogen:

- By electrolysis from dedicated, combined, solar and wind farms
- By electrolysis from electricity from the grid in the off-peak hours
- By electrolysis from variable surplus electricity
- From surplus hydrogen from ANCAP "La Teja" refinery

Preliminary studies show green hydrogen could be produced at an ex-plant cost of 3.5 to 5.5 USD per kilogram. We believe this is highly cost-competitive with benchmark hydrogen costs in other regions.

REASON 4 – THE DECARBONIZATION OF TRANSPORT IS A NATIONAL PRIORITY

The centralized nature of the country, as well as the distances between cities (short for the regional standard), universal coverage of the electric system, enabling policies, and good road infrastructure make Uruguay an ideal place to incorporate both battery and hydrogen electric vehicles in an accelerated way

Hydrogen vehicles with fuel cells have a promising future in the country, in particular for the transport of passengers and cargo: current fleet includes about 3,600 intercity buses, and 63,000 trucks of which 20,000 are intercity trucks.

The country is also interested in developing additional pilot projects for freight transport with hydrogen, both trucks and trains.

Hydrogen can accelerate the decarbonization of transport, which is a national priority

- The transport sector represents 28% of the total primary energy consumption (second after industry), and is the main emitter of CO2 [3][7]. Therefore, it is a strategic sector for decarbonization.
- The country has been a regional pioneer in developing clean mobility infrastructure: as an example the country has the first electric route in Latin America, covering 320 kilometers along the south corridor with 23 charging points. By end 2019 the whole country will be covered by a network of charging station no more than 60 kilometers apart
- Cargo vehicles (both light and heavy duty) constitute 19% of the total fleet, yet they are accountable for 56% of total CO2 emissions of the transport sector. Thus, there are large potential gains in promoting a deep transformation of the transportation sector
- The incorporation of zero emission vehicles is strongly promoted by the national government, with specific laws for reduced import duties for vehicles, income tax deductions for businesses using zero emission fleets, and incentives for zero emission buses.
- A fuel cell bus pilot is being studied, and there is interest in promoting Uruguay as proving grounds for fuel cell vehicles, mainly buses, trucks, and even trains (a particular project involving rail transport of pulp is on the works)

REASON 5 – NATIONAL ACTORS ARE ALIGNED AND WORKING TOWARDS A COMMON VISION FOR HYDROGEN IN URUGUAY

The Ministry of Industry, Energy and Mining (MIEM), ANCAP and UTE are coordinating their efforts to create a hydrogen roadmap for Uruguay, starting with the official presence of the country in the 2019 Hannover Messe.

Asides from building a common vision and a roadmap for green hydrogen in Uruguay, they are also working together on developing key pilot projects: fuel cell buses for intercity transport, green methanol production to improve conditions for national biofuels, and innovative storage technologies.

ANCAP is a solid partner for developing hydrogen projects in Uruguay, and is articulated with other key stakeholders

- ANCAP, the national oil and gas company, has a rich history: it has over 88 years of history providing quality fuels and products, with a well-established brand and network of distribution centers and service stations covering the whole country
- ANCAP is also experienced with hydrogen production in its own high-conversion refinery
- The company is eager to expand their portfolio beyond the traditional O&G business, as they see both electrification, hydrogen and storage as key enabling technologies for decarbonization.
- ANCAP, UTE (the national electric utility company) and the Ministry of Energy are working together to combine their strengths and assets towards this common goal and push for pilot project realization
- ANCAP is studying innovative ways to store hydrogen, our Exploration and Production Department is currently studying the geological storage of hydrogen in the saline aquifers of the Santa Lucia basin onshore Uruguay, leveraging on a previous study for natural gas storage

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