



Ministerio
de Industria
Energía y Minería



Uruguay – The Ideal Partner for Green Hydrogen Demonstration Projects

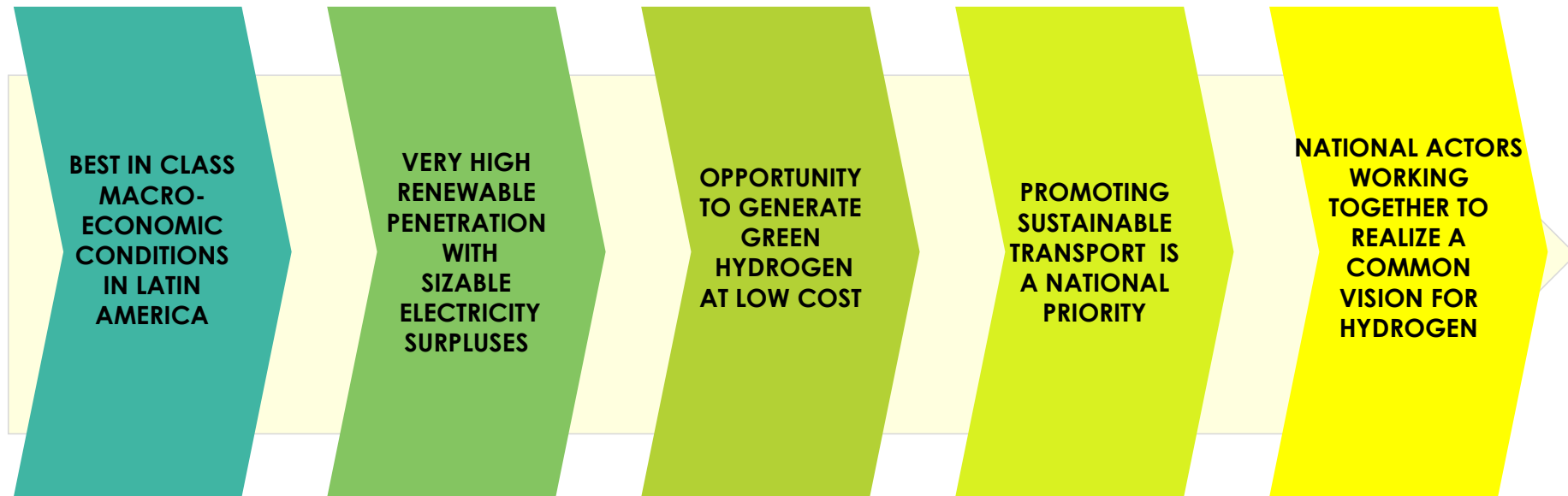
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5 key reasons for developing hydrogen demonstration projects in Uruguay







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 have earned Uruguay investment grade 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 3.5% between 2009 and 2018.
- The country has a Law on the Promotion and Protection of Investments that establishes that foreign investment receives the same treatment as national ones.
- 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 2018 CAF structured a second trust fund for USD 500 million which also finances infrastructure projects; in 2019 CAF launched a third trust fund for USD 350 million for the design, construction, rehabilitation and maintenance of a central railway track.
- **Multilateral organization funding**, which channel foreign resources for the development of the country. The IDB, the CAF and the World Bank 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 has a remarkable multi-party backed 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.
- 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.
- Uruguay 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, **Uruguay positions itself as the best partner for the implementation of innovative green technology pilots and projects in the region.**



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, its 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

- The State Energy Policy made a strong commitment to renewable energies, with ambitious goals in the short term, promotion laws and tax incentives.
- The power matrix is 98% renewable (2018: 44% hydro, 33% wind, 18% biomass, 3% solar, 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 260 MW in the same time.
- In 2018, Uruguay ranked 4th in the world in relation to the amount of electricity generation based on wind and photovoltaic, according to the International Energy Agency.
- World Economic Forum's Energy Transition Index 2019 places Uruguay in the top 10% percentile of high performers.
- Thus, Uruguay can be considered as a country where the energy transition (on the generation side) has already occurred, and where new opportunities are arising from the end-use side.

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.
- Uruguay is working on a pilot project for a hydrogen ecosystem that fosters internal hydrogen use for transport and industry.
- Once the costs of hydrogen storage scale down, 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.
- In the long term, a hydrogen economy based on surplus 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, as well as 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 several technically feasible options to produce green hydrogen by water electrolysis using electricity:
 - From the grid in the off-peak hours
 - From dedicated, combined, solar and wind farms
 - From variable surplus electricity
- Preliminary studies show green hydrogen could be produced at an ex-plant cost highly 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 regional standards), universal coverage of the electric grid, enabling policies, and good road infrastructure make Uruguay an ideal place to incorporate both battery and hydrogen electric vehicles in the short term.

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 road trucks.

The country is currently developing a pilot project for the use of hydrogen in fuel-cell heavy duty vehicles.

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

- The transport sector accounts for 70% of imported oil and 64% of the country's CO2 emissions [3][7]. Therefore, it is a strategic sector for decarbonization.
- 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 country has been a regional pioneer in developing clean mobility infrastructure: as an example the country has the first electric route network in Latin America, with 38 charging points. By end 2020 the whole country will be covered by a network of charging station no more than 60 kilometers apart.
- 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.
- Uruguay is promoting its potential as proving grounds for fuel-cell heavy-duty vehicles, mainly buses and trucks, and possibly freight trains (a project for rail transport of pulp is under construction).



Reason 5 – National actors are aligned and working towards a common vision for hydrogen in Uruguay





The Ministry of Industry, Energy and Mining (MIEM), the State Oil & Gas Company (ANCAP) and the State Utility (UTE) are coordinating their efforts to develop a Hydrogen Roadmap for Uruguay.

They are jointly working on Verne, a pilot project for the production of green hydrogen and its use in fuel-cell, heavy-duty road trucks and passenger buses.

The goal of Verne is to introduce hydrogen as an energy carrier, build a pilot ecosystem of hydrogen and its associated technologies, identify technical, legal and regulatory barriers and gaps, generate local knowledge and capabilities, and inform the development of the Hydrogen Roadmap.

The Roadmap will address the scaling up of hydrogen in transportation (potential fleet of 3,600 intercity buses and 20,000 road trucks, freight trains, ferries, river barges, etc.), production of chemical feedstocks (ammonia and methanol), and export potential.

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

- ANCAP has a rich history of over 88 years 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 and use in its own high-conversion refinery.
- The company is eager to expand its portfolio beyond the traditional O&G business, as it sees electrification, hydrogen and storage as key enabling technologies for decarbonization.
- MIEM, ANCAP and UTE are working together to combine their strengths and assets towards this common goal and push for a pilot project realization.
- ANCAP is studying innovative ways to store hydrogen. Its 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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▲ ANCAP



Contact





ANCAP

Paysandú y Av. Libertador

C.P. 11100 – Montevideo - Uruguay

Phone: +598 2 1931

Email: hidrogeno@ancap.com.uy

Web: <https://www.ancap.com.uy/>



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