

RESÚMENES DE TRABAJOS PUBLICADOS

Hidrógeno y derivados a partir de eólica marina en Uruguay.



GERENCIA DE TRANSICIÓN ENERGÉTICA

2023

Ferro, S., Tomasini, J., Gristo, P., Novo, R. *Analogies from the E&P business model applied for green Hydrogen developments offshore Uruguay*. Offshore Technology Conference, Houston, Texas, USA, May 2023. In Press.

Uruguay is at the forefront in the use of renewable energy sources and has almost totally decarbonized its electricity matrix, reducing its dependence on fossil fuels. The country is advancing into a second energy transition, including the development of a green Hydrogen (H₂) economy. This work presents the Analogies from the Exploration & Production (E&P) business model applied for green H₂ developments offshore Uruguay.

Considering the sovereignty Uruguay has in activities such as the production of energy from wind in its Exclusive Economic Zone (EEZ), the Uruguayan NOC has based its vision for a sustainable future on the H₂U Offshore Round, for which it will offer offshore areas on bidding rounds for energy companies to carry out feasibility studies and potential installation of infrastructure to produce H₂ from offshore renewable energy, at their own cost and risk entirely. In this work, the authors elaborated a probabilistic technical and economic model, including all the relevant considerations for the green H₂ development project, which was used for the design of the proposed fiscal regime for the H₂U Offshore Round.

The Uruguayan NOC is managing and articulating the traditional Oil & Gas (O&G) upstream business and the green H₂ offshore program together simultaneously, maximizing the synergies among them. The offshore of Uruguay presents a large technical potential and excellent conditions for wind resource, with high wind speed, capacity factors and the availability of large areas. This paper includes the main features of the H₂U Offshore Round bidding terms and the contract model, highlighting the synergies and analogies with the E&P projects. In addition, the results of the abovementioned probabilistic model, such as project profitability measures, breakeven hydrogen price and minimum economic capacity factors are presented.

In the recent past, Uruguay was able to attract over a billion of US\$ of risk capital from the major O&G companies for exploration of hydrocarbons offshore. Hence, the NOC's innovative approach is to bring several similarities from the E&P business to the H2U Offshore Round, with a sound and fair balance between risk and rewards for the energy companies, leading a responsible transition pathway from fossil fuels to green hydrogen in Uruguay.

2022

Tomasini, J., Gristo, P., Ferro, S., Novo, R. *Assessment of the Potential for Hydrogen Production from Bottom Fixed Offshore Wind in Uruguay*. Offshore Technology Conference, Houston, Texas, USA, May 2022.

doi: <https://doi.org/10.4043/31879-MS>

After having decarbonized almost the entire electricity matrix, the next step in the Uruguayan energy transition includes the development of a hydrogen economy, for which both local and export markets are being considered, based on vast untapped unconventional renewable resources potential onshore and offshore. For ANCAP (NOC), hydrogen is key in the transition to a low-carbon and sustainable energy company, hence initiating several actions including the assessment of the potential for hydrogen production from offshore wind. Leveraging on data and information from offshore oil and gas exploration projects, distinct regions were delineated as the most suitable for the development of offshore green hydrogen production projects both from bottom fixed and floating wind technologies. In this work we present the results of the potential assessment of two regions suitable for bottom fixed offshore wind technologies.

Region 1 is located at the interior waters of the Uruguayan territorial sea at distances longer than 10km from the coast and water-depth ranging from 10 to 30 m. Region 2 is located on the Uruguayan Exclusive Economic Zone at distances longer than 60 km from the coast on water-depth ranging from 20 to 60 m. The assessment of the potential of these regions includes both the power generation and hydrogen production according to stochastic model based on capacity density data from North and Baltic Sea projects, energy requirements for PEM electrolysis technology and capacity factor data specific for offshore Uruguay. Additionally, both regions were evaluated and compared based on other inferred aspects derived from different development concepts, such as social acceptance, OPEX, CAPEX and logistics among others.

Results indicate that Region 1 and Region 2 have potential for power generation of 14GW and 110GW respectively, that corresponds to hydrogen production potential of 1.2Mton/year and 10Mton/year respectively (indicated figures corresponds to mean

values). From contrasting both regions on other different aspects, results that Region 1 has advantages regarding CAPEX and OPEX while Region 2 has advantages regarding potential social acceptance and logistic requirements. Calculated hydrogen production potential for both regions represent more than eighty times the equivalent diesel currently consumed in Uruguay for heavy duty transport, demonstrating the relative size of the local market compared with the offshore potential. On the other hand, already announced green hydrogen future requirements for Europe and Asia suggest attractive markets for this kind of developments.

For the first time the potential for hydrogen production from bottom-fixed offshore wind in Uruguay was assessed indicating very attractive results, both technically and economically, for the export market. Results are encouraging as lead to new possibilities to support the next energy transition in the country towards the development of a hydrogen economy.

2021

Gristo P, Tomasini J, Ferro S, Novo R. *Potencial de producción de Hidrógeno a partir de energía Eólica Marina en Uruguay*. In: AIQU (ed) VII Encuentro Regional de Ingeniería Química. Montevideo.
