

"Hidrógeno en Uruguay" Academia Nacional de Ingeniería

Juan Tomasini Junio 2022





The information included in this presentation regarding bidding terms, contract model, schedule, regions and areas is tentative and should be considered as a draft. Official and final version of this information will be released once the bidding terms are approved and published by the Executive Branch.

H₂U PROGRAM: PRIVATE INVESTMENT WITH GOVERNMENT SUPPORT



ANCAP ASSETS



- More than 50 years of experience in the production, consumption and handling of hydrogen
- Catalytic Reforming Units, HDS, PG+, for hydrogenation of naphthas and middle distillates.
- H₂ surplus approx. 7000 kg / day (could replace the diesel consumption of 20% of Montevideo's bus fleet)
- Hydrogen storage for start-up of process units



ANCAP'S ROLE IN OFFSHORE HYDROGEN

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- 2D onshore and offshore seismic surveys
- 3D offshore seismic surveys
- · Gravimetry and magnetometry
- · Wells' data (logs and reports)
- Onshore magnetotelluric data and outcrop samples
- Selected screenshots are also provided

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Active Role as agent from the State, based on valuable and distinct characteristics:

- Offshore data and knowledge
- Experience in offshore operations
- Geological and reservoir engineering knowledge
- Experience in offshore bidding rounds and contracts with international companies



OFFSHORE DATA AND KNOWLEDGE

- Seabed sampling
- Bathymetry
- Metocean data
- Environmental information (marine species)





OFFSHORE **OPERATIONS**

Since 2007 more than 28 000 km of 2D seismic and 41 000 km² of 3D were acquired. In 2016 Raya X1 was drilled (world record until 2022)

- Experience in fiscalization
- HSE certified personnel (BOSIET, MAERSK, etc.)
- Coordination of big projects with national stakeholders

(DINACEA, ANP, DNA, SOHMA, PNN, DINARA,

submarine cable operators, ONGs, etc.)

Manual for Exploration Operations Offshore Uruguay







CONTRACTS WITH MAJOR ENERGY COMPANIES

- Contracts with Major Energy Companies
- 1500+ million USD invested in O&G exploration
- Big offshore projects (not new for Uruguay,

ANCAP, H2U offshore team)







H₂U OFFSHORE: ANCAP'S VISION FOR A SUSTAINABLE FUTURE



[1] TRACTEBEL

In 2022 ANCAP is planning to tender **offshore areas** for energy companies to carry out feasibility studies and potential installation of infrastructure for the production of H_2 from offshore renewable energy, at their own cost and risk entirely.



TECHNOLOGIES

Electric Power Generation from Renewable Sources	Green Hydrogen Production from Electrolysis		Hydrogen Conversion to Carrier
Bottom-fixed wind	Alkaline		Compressed Hydrogen
Floating wind	Proton Exchange Membrane	onshore /	Liquid Hydrogen
Solar Photovoltaics	Solid Oxide Electrolyte	offshore	LOHC
Wave/Tidal	Anion Exchange Membrane		Ammonia
Site assessments	Water treatment	Hydrogen Storage	Transport
Resource / Metocean	Aquifer water	Tanks	Pipeline
Geology / Geophysics / Geotechnics		Underground	
Environmental / Human & Social	Sea water desalination	/ Geological	Oceanic Vessel

Technologies and sub-technologies involved in the production of hydrogen from offshore renewable sources



H₂ PRODUCTION FROM WATER ELECTROLYSIS **DEVELOPMENT CONCEPTS**

Development concept completely offshore (no need for deep water harbor or onshore facilities)

(H₂) URUGUAY

FLEXIBILITY for the contractor to propose development concept including:

- Offshore/Onshore Electrolysis
- Project scale (phases)
- Type or H₂ Carrier (NH₃, LH₂, etc)
- Market/Off-taker

WHEN?

- With submission of Project
 Development Plan
- After a 10 years (max) of evaluation periods



DEVELOPMENT CONCEPTS – ONSHORE ELECTROLYSIS







DEVELOPMENT CONCEPT – OFFSHORE ELECTROLYSIS





OFFSHORE WIND TO H2 PROJECTS

H ₂ Production	Location	Project	Reference
Onshore	Korea	Donghae 1	(Ellichipuram 2021)
	Brazil	HUB of Green Hydrogen Pecém	(PoR 2021)
	Germany	Ludwigshafen Chemical site	(BASF 2021)
	Netherlands	Holland Hydrogen 1	(Durakovic 2022)
Offshore	France	SEM-REV test site	(Buljan 2021a)
	Scotland	Dolphin	(ERM 2021)
	Denmark	Brande Hydrogen	(Buljan 2021b)
	Vietnam	Energy Plus	(reNEWS 2021)
	Netherlands	PosHYdon pilot	(Neptune Energy 2022)
	North Sea	Oyster	(Parnell 2021)
	Norway	Deep Purple	(TechnipFMC 2021)
	North Sea	AquaVentus	(AquaVentus 2020)
	Germany	H2Mare	(Heynes 2021)
	Scotland	HT1	(Buljan 2022)

Announced projects related to hydrogen production from offshore wind





EXCELLENT WIND CONDITIONS



[Data/Information/map obtained from the] "Global Wind Atlas 3.0, a free, web-based application developed, owned and operated by the Technical University of Denmark (DTU). The Global Wind Atlas 3.0 is released in partnership with the World Bank Group, utilizing data provided by Vortex, using funding provided by the Energy Sector Management Assistance Program (ESMAP). For additional information: https://globalwindatas.infor



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[3] GLOBAL WIND ATLAS

REGIONS



Criteria for región selection

Favorable conditions for existing wind technologies Minimal environmental and anthropic interference Artisanal fishing Coastal protected áreas Safe navigation channel Industrial fishing areas cat. A and B

Potential (mean values)

144 GW

14 MtonH₂/year



REGIONS

Region 1:

Water Depth: 10-30 m Distance to the coast > 10 km Estimated Capacity*: 14GW Est. Prod.: 1,2 MtonH₂/year

Region 2:

Water Depth < 60m Distance to the coast > 60 km Estimated Capacity: 110 GW Est. Prod.: 10 MtonH₂/year







CONTRACT TERMS



[6]

Multiclient data licensing Market development (offtaker)

*Advancing from one Period to the next is the company's right (after fulfilling commitments)



EXCELLENT CONDITIONS FOR OFFSHORE HYDROGEN DEVELOPMENT IN URUGUAY

Large offshore potential

- Large Technical Potential
- High capacity factors (> 55%)
- Availability of large areas

In addition:

- Successful first energy transition (power sector)
- Strong drive from the Government for the second energy transition, one of whose pillars is green hydrogen
- Country stability and reputation
- Good inter-institutional coordination

Offshore hydrogen bidding round

- Timely and innovative, first mover
- Aimed at capturing high market interest in investments in clean energy



CONCLUSIONS



- Uruguay is a reliable and stable country, leader in generation of clean energies; above ground risks minimized
- Successful 1st energy transition (power sector), strong drive from the Government for the 2nd energy transition, with green H₂ as pillar
- ANCAP is Uruguayan NOC, has assets and experience working with H₂ and dealing with major energy companies.
- Excellent wind resource offshore Uruguay
- A lot of analogies with E&P bidding terms and contract models
- Ongoing bidding rounds: every year



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