CIRCULAR WATER AND ENERGY PARK WUINK KAI (WATER AND SUN)		
Thematic Focus	Energy transition- solar energy	
Sector	Electric Energy	
Entities/Areas	Mayor's Office of Uribia and Center for Innovation and Entrepreneurship (CIE) of La Guajira.	
Contributing partner	Private	
Strategy of the National Development Plan to which it aims	i) Resilient cities and habitats; ii) Economic transition to achieve carbon neutrality and consolidate climate resilient territories, environmental justice and inclusive governance. iii) Economic development based on energy efficiency; iv) Just energy transition, based on respect for nature, social justice and sovereignty with security, reliability and efficiency; v) Women as drivers of sustainable economic development and protectors of life and the environment. vi) Restructuring and development of national and regional systems of productivity, competitiveness and innovation; vii) Productive economy through reindustrialization and bioeconomy; viii) Recognition and promotion of the Popular and Community Economy, Sustainability and business growth; ix) Nature conservation and restoration program.	
ODS to which it aims	Aims at: i) Sustainable cities and communities; ii) End of poverty; iii) Zero hunger; iv) Climate action; v) Clean Water and Sanitation; vi) Affordable and non-polluting energy; vii) Health and well-being; viii) Industry, innovation and infrastructure.	
Description of Project	Purpose of the project	Introduce a model for the production and export of green ammonia with local social benefit, taking advantage of the strategic position, port availability and energy and marine resources offered by three bays in northern Colombia.
	Objectives	Through the project, it is intended to: i) generate 50 MW of energy through flexible solar panels, arranged on floating platforms; ii) produce 118,230 Nm 3 of green ammonia per year; iii) Introduce the technical cultivation of macroalgae, making use of floating platforms, for the extraction of 1,200 tons of protein-based meal for the production of by-products of high commercial value, as an economic alternative for fishing communities; iv) Generate 533 liters/min of oxyhydrogen HHO as a source of thermal energy for plastic pyrolysis and water evaporation. v) Obtain 7,000 liters of fresh water per day through the evaporation of salt water, its condensation and mineralization and electrification for five communities; vi) Obtain 4,500 liters of fuel per day from the pyrolysis of 100 kg of plastic and tires per day to supply fuel to communities, as a measure to reduce deforestation; vii) For a second phase, scale the process to 1000 hectares in Bahía Portete.
	Geographic Area of Influence	Alta Guajira, municipality of Uribia.
	It is included	Yes _x_ No___

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	within the goals of the PND:	
	Structuring Phase	Formulation and socialization.
	Goal: (km), (panels etc)	First phase: 50 hectares, 60,000 M3 of green ammonia per year. Second phase: 1,000 hectares, 1,182,300 NM3 of green ammonia per year.
	It is located in a protected area or with indigenous/afro-descendant communities:	Yes_x__No_____Which__Alojaa Anamaia artisanal fishing reserve.
Description of Project	1. Formulation, socialization and consulting: 4 months. 2. Obtaining permits from ANLA and AUNAP: 4 months. 3. First phase execution: 12 months. 4. Projected second phase execution: 30 months.	
Contributions	Total Value	$200 million dollars
	Nation Contribution	Pending to define
	Contribution of Territorial Entities	Pending to define
	Private Contribution	$200 million dollars
Opportunity to Investment	The project is located in the north of Colombia in the area with the greatest potential for the generation of solar and wind energy. It is aimed exclusively at the production of green ammonia, as the energy of the future, since while hydrogen liquefies at a temperature of -253°C, ammonia only requires cooling to -33°C, reducing costs and increasing transport capacity. The lower ammonia requirements make this process much more competitive and energy efficient than H2 transport. In this way, once the necessary infrastructure for the import, storage and cracking of ammonia is developed, it will be possible to produce green hydrogen in places with optimal conditions (competitive renewable energy) to later export it to other consuming regions in liquid form. The project area has three bays with potential for the scalability of the project, one of them with a port currently used for the export of coal, which has an airstrip, railway line and road access. The three bays can be interconnected by sea and by land for the collection of ammonia, and a pipeline can even be contemplated to transport hydrogen to a single ammonia plant. The proposed system does not go against local fishing activities nor does it affect the biological corridor of migratory birds, a situation for which the Wayuu culture will not allow	

<table>
<tr><th colspan="2">CIRCULAR WATER AND ENERGY PARK
WUINK KAI (WATER AND SUN)</th></tr>
<tr><td></td><td>the introduction of high-capacity wind generators in the reserve. The proposal has the acceptance of the indigenous community.
The cultivation of algae entails a broad local benefit, far above any productive activity of extraction of fishing resources. Additionally, it will benefit the community by providing water suitable for human consumption and generating fuel to replace the use of wood as a heat source for cooking food.
With the available solar energy resource and the technology used, it is projected to produce a kilogram of hydrogen below $USD 3.
The hydrogen generation technology used is modular (5 MW each) and compact turnkey. The project can be expanded in two additional phases to 10,000,000 hectares and its equivalent to 11,823,000. NM3 of green ammonia /year.
The project can sell additional carbon credits for CO2 sequestration and oxygen production through algae cultivation.</td></tr>
<tr><td>Analysis of Market</td><td>In 2023, the ammonia market reached a value of approximately 198.50 MMT. Furthermore, it is estimated that the market will grow at a compound annual rate of 1.9% between 2024 and 2032, reaching a sum of 235.14 MMT in 2032.

For its part, the study carried out by IDE in the regional markets of Brazil, Argentina, Mexico, Chile, Colombia and others, shows that by 2023, the Latin American ammonia market reached a value of around 8.49 MMT, and that It will register strong growth during the forecast period of 2024-2032, to reach 10.52 MMT in 2032.</td></tr>
<tr><td>Financial projections</td><td>To begin with, it should be noted that the income projection is calculated based on the performance of the technology to be used, corresponding to $USD 2 per kg of green hydrogen.

Now, countries like Germany are willing to invest more than 5 billion euros in international hydrogen purchases in the coming years; In fact, the first German auction was launched in December 2022, and allocated 900 million euros for the purchase of imported green ammonia, methanol and sustainable aviation fuel.

Offers are currently being evaluated for the first deliveries, which should occur in 2024 or 2025. In addition to this, the FOB purchase price of green ammonia in Colombia has not yet been established; However, the new Bloomberg NEF report details how the price of green ammonia compared to gray ammonia is following the same trend. Thus, the price of a kilo of green ammonia is between 4.50 and 6.04 dollars per kilogram. All these prices that the study shows are calculated based on costs calculated on March 2.

<table>
<tr><td>OPEX</td><td>$200 MUSD</td></tr>
<tr><td>CAPEX year</td><td>$ 65.000 MUSD</td></tr>
<tr><td>Amoniaco sells year</td><td>$ 473.8 MUSD</td></tr>
<tr><td>Utilities year</td><td>$408.8 MUSD</td></tr>
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Considerations of sustainability and ESG	he project stands as the first initiative in the country and in La Guajira for the production and export of green ammonia, within the framework of a fair energy transition; Added to this, it is the first model worldwide for non-conventional energy generation that involves marine agriculture activity. In addition to complying with eight SDGs and nine of the PND, through the Alliance that formulated this proposal, the following points were presented in the new Departmental Development Plan: i) Request the ANLA to authorize the ports used for the export of coal and ammonia, and to transfer it to ships that operate with this fuel. ii) Promote the creation of small green hydrogen hubs for the production of green ammonia. Well, it must be indicated that the importance of ammonia lies in the fact that it is established as a unique alternative for the use of solar and wind resources for the production and commercialization of liquid chemical energy, easy to transport and of great value in the market; the above, in non-interconnected peripheral areas that cannot sell energy to the grid. iii) Introduce the course on water processes, alternative energies and waste recovery as high school subjects in schools in prioritized municipalities. Given the mining vocation of the municipality and the objective of decarbonization of La Guajira, it is a priority to introduce culture and training to youth in the knowledge of the chemical nature of La Guajira's own water, its contaminants, how to identify them, how they are measured and how they can be removed at home. At the same time, it allows stimulating circular initiatives through the creation of an environmental classroom and contests based on the different uses of solar and wind energy, electrolytic processes, production of green hydrogen and its entire value chain, production of green nitrogen and ammonia. green. Likewise, it helps train students in waste recovery; plastic recycling processes, fuel extraction by pyrolysis, energy generation by biomass, transformation of organic waste into protein and other utilization processes. Without a doubt, the project resolves two of the most relevant points of the ruling T-302 of 2017 of the Constitutional Court, which declared the State of Things Unconstitutional regarding the special protection of the rights to water, health and food for indigenous communities. Wayuu from the municipalities of Riohacha, Manaure, Uribia and Maicao in the Department of La Guajira. On the other hand, it is an initiative that obtained the approval of the indigenous authorities, who indicated that it was a real solution to the problem of income generation, drinking water, energy and fuel for cooking food. Even more, the aforementioned communities stated that the proposal for floating solar platforms DOES NOT harm their fishing activity or the migration of birds, but rather, contrary to that, it favors the presence of fish, given that seaweed is food and shelter for other species. in the sea, which clean coastal waters by removing excessive nutrients from runoff waters, and absorb large amounts of carbon dioxide from the water. In turn, the design of the platforms (100 m x 1 m) and the separation of three meters from each other allows light to enter the photic zone of the bay, without altering natural cycles; Added to the above, by including the pyrolysis of plastic, using oxyhydrogen HHO as fuel, it is innovating by becoming a process without emissions with a low carbon footprint,

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	preventing tons of plastic from reaching the sea that become microplastics that affect marine life.
Evaluation and Mitigation of Risks	One of the most representative advantages of the proposed design is that since they are bays, the platforms are protected against tidal waves and rough seas. In addition, and unlike panels installed on land, they do not accumulate sand dust, maintaining their efficiency.
Project Team and experience	The team is made up of the social part by FEDIAGROG, a second-level federation that represents the communities and associations that live in the area of influence of the project. The formulation and design of the project is in charge of: i) The R&D&I department, made up of the Bionic Biosafety and Environment commercial alliance, with a team with 15 years of experience in La Guajira, an active participant in the sheet hydrogen route for Colombia, builder of the largest electrolytic reactor in Latin America in a composite water purification/hydrogen production model in the Municipality of Albania, La Guajira; ii) the company Chess Engineer, a technology provider with extensive experience in hydrogen projects and international reach; iii) There is also the support of Yocogawa, the most efficient international supplier of plug and play modular hydrogen plants on the market; and iv) Gencell, a company dedicated to the production and storage of green ammonia.