

Aquatic Renewable Energy Potential in Colombia: A Preliminary Study

Founder and CEO, Prof. Dr Ramón Fernando Colmenares-Quintero



Science, Technology, Innovation, and Culture
LATAM & European Network



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Aquatic Renewable Energy Potential in Colombia

Wave Energy

The winds interacting with the sea surface transfer energy, and this results in the generation of waves. Moreover, the winds are caused by pressure differences in the atmosphere created by solar heating



Tidal Energy

Tidal stream technologies rely on the tides created by the gravitational pull of the moon and sun on the seas

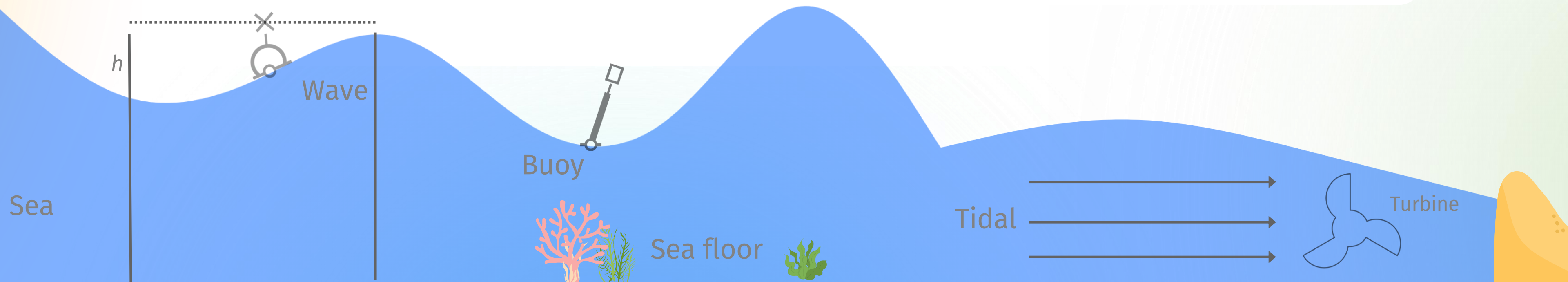


Potential

Region	Seasonal mean power
Santa Marta	→ 4.5 kW/m
Barranquilla	→ 5 kW/m
Isla de Providencia	→ < 1 kW/m
Isla de San Andres	→ < 1 kW/m
Isla Fuerte	→ 1.4 kW/m

Potential

Region	Mean current speed
Bahía Málaga	→ 0.8 m/s
Buenaventura canal	→ 1.5 m/s
Buenaventura Port	→ 3 m/s



Aquatic Renewable Energy Potential in Colombia

Run of River Energy

This resource has an important application with hydrokinetic turbines, which capture and harness the energy of a moving fluid and convert it into electricity




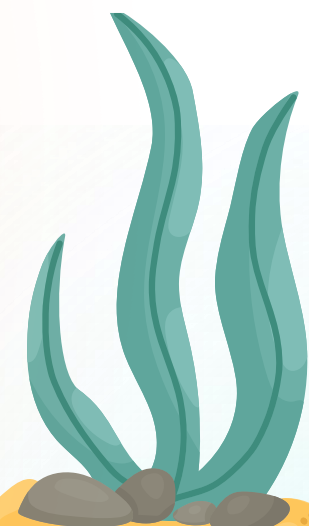
Potential

The local mean water speed needed for RH would be between 1.5 and 2 m/s as a limit for commercial viability.

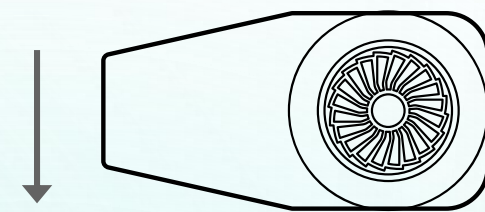


 Main Rivers

 Existing hydro projects



Run of river

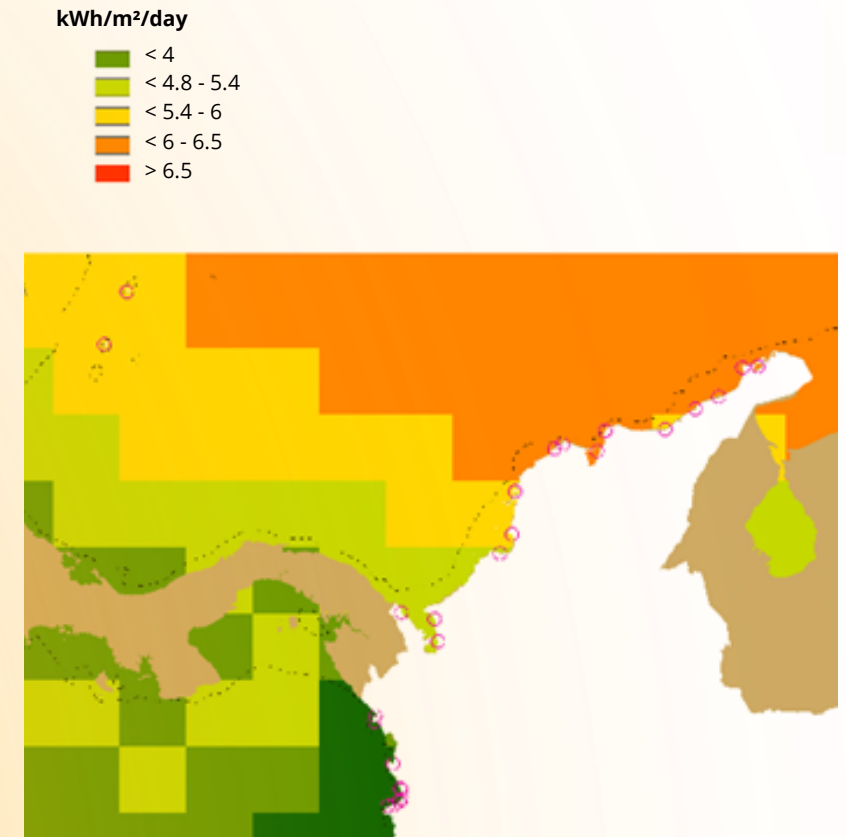
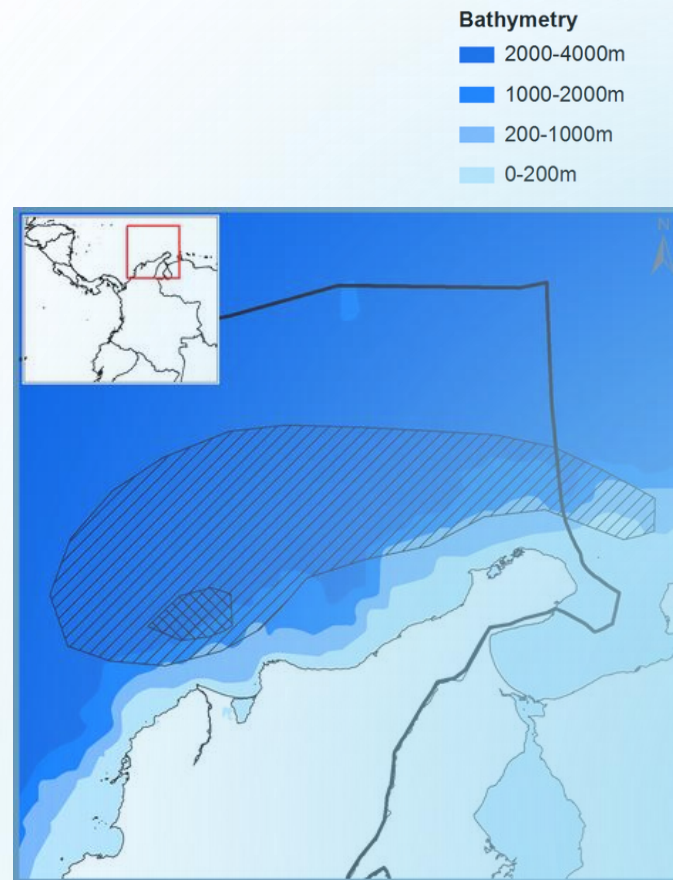
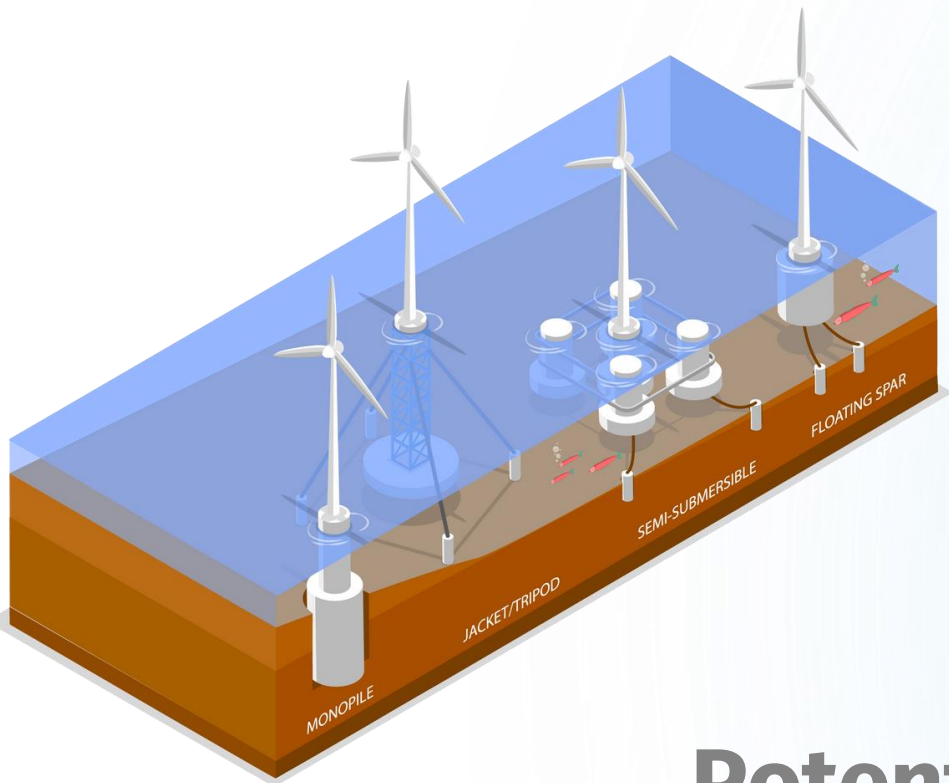


River Turbine

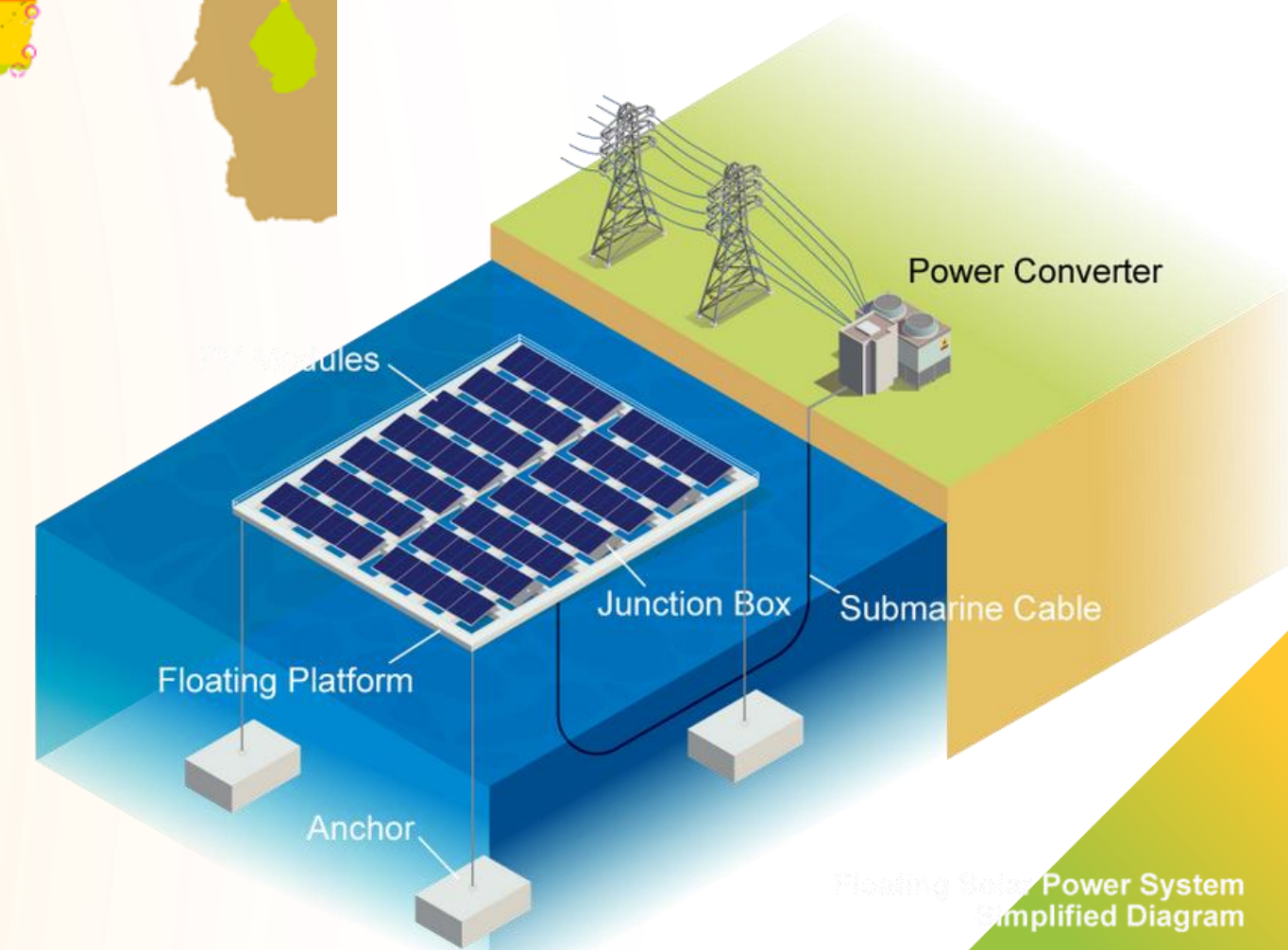
Aquatic Renewable Energy Potential in Colombia

Opportunities for hydrogen production

Floating Wind Energy



Floating Solar Energy



Potential

Location

La Guajira

Communities around Barranquilla

Coast Region of Urabá

Rest of Colombia

Medium Power Density 20m Height (W/m²)

→ 1000-1331

→ 216-512

→ 125-216

→ Less than 125

Floating Solar Power System Simplified Diagram

Needs/Opportunities identified in Colombia

Labour costs in Colombia are lower and devices can be manufactured more cheaply than in many countries in the US and Europe



Overall rates for vessels, crew and divers are also lower in Colombia than in many other areas.



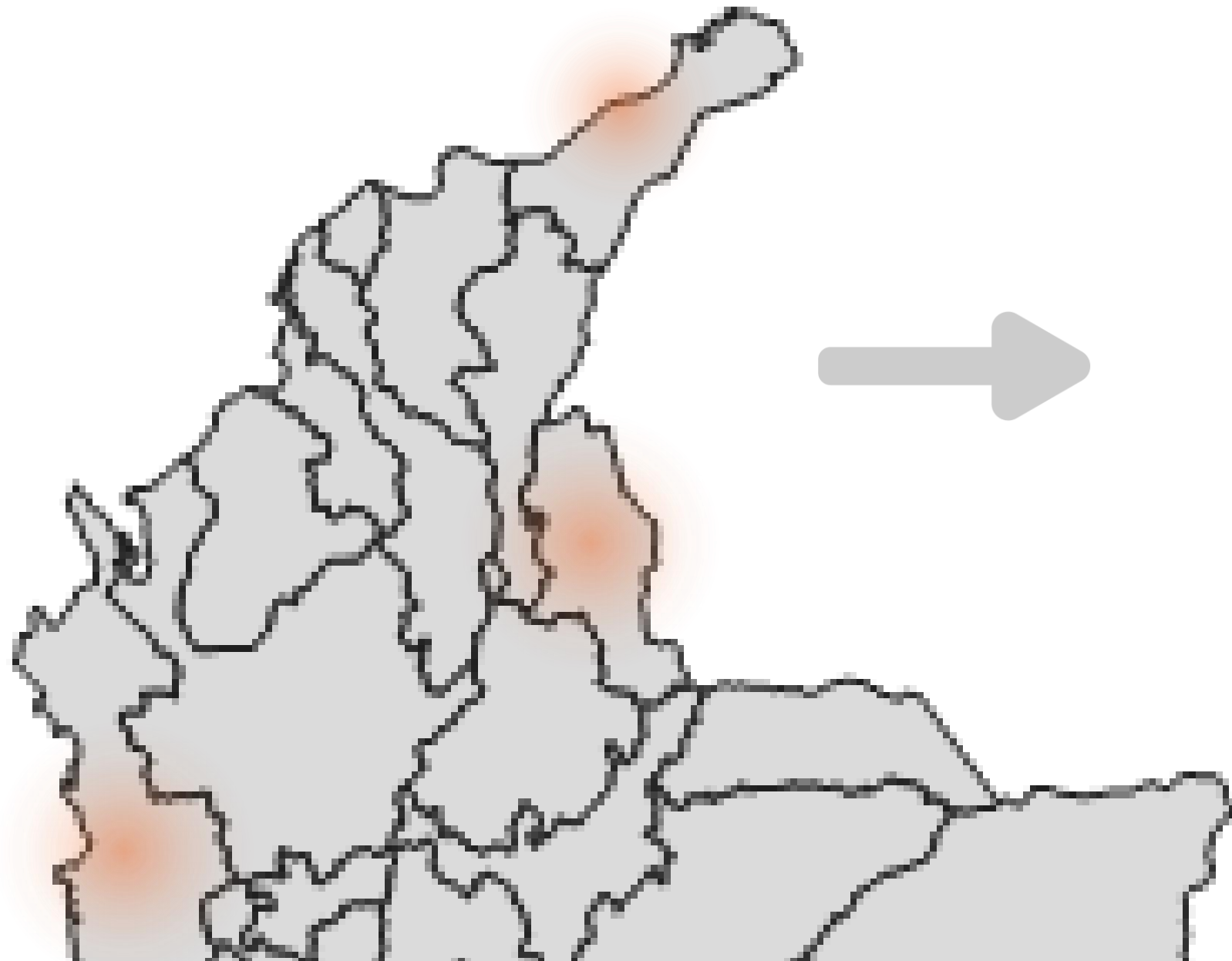
There are many off-grid/rural areas with a high demand for transmission and distribution systems, and therefore rely on fossil fuels with a high cost of power generation and environmental impact.



Niche markets are a viable approach for pilot projects in the country.



Projects carried out in line with needs

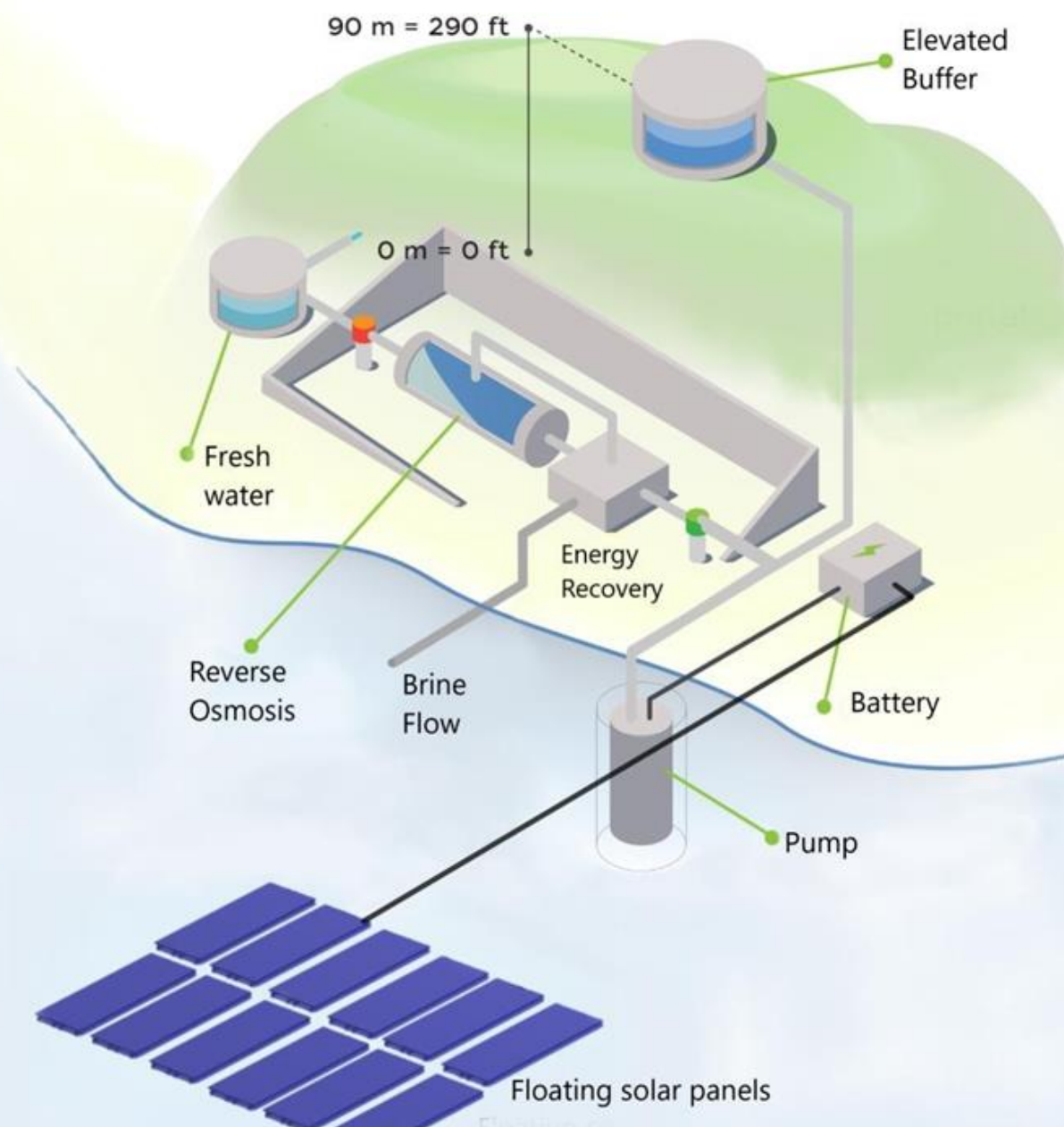


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BERSTIC Projects in ARE



Sustainable Water by floating solar Energy powered Efficient reverse osmosis Treatment: SWEET Project



The consortium is made up of the two companies from Holland and the representation of the academy from Colombia, sponsored by the Partners voor Water fund of the Dutch Government.

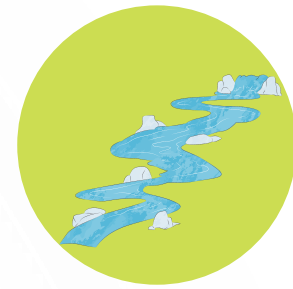
- A small-scale desalination facility was built, with the capacity to supply the daily water needs.
- The project greatly reduces the costs of importing water and diesel and saves greenhouse gas emissions by replacing the transport of water and diesel.
- The development of the project results in high publicity and a green image; the operation of the SWEET facility generates new employment opportunities.



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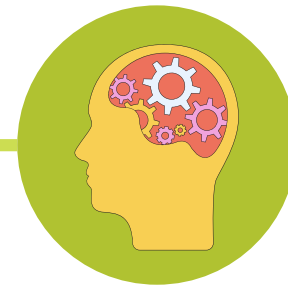
Other BERSTIC projects in ARE

2016 - 2017



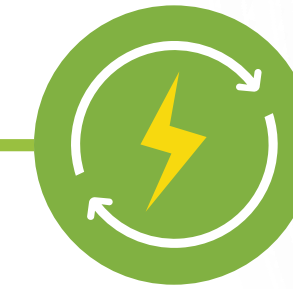
Accelerating Marine & Run of River Energy in Colombia: Industry-Academia Partnership Programme

2018 - 2019



Identification of Knowledge Gaps in the Academia and Capacity Building for Aquatic Renewable Energy in Colombia

2019 - 2021



Enhancing Aquatic Renewable Energy (ARE): Technology design and adaptation programme for Colombia



Partners



BERSTIC Projects in Knowledge Transfer

Towards a sustainable and inclusive Colombia: engineering business opportunities based on science, technology and innovation



This project is unique as it brings together 4 key actors (industry-academia-communities-governments) between Colombia and the United Kingdom to understand their needs and thus be able to translate them into sustainable engineering solutions.

This can be achieved by discussing in the different workshops and meetings the opportunities of the Cyclical and Closed Loop Economy for Industrial Symbiosis and the thinking, design and implementation of the system of systems for the national benefit in all sectors, including the socioeconomic benefits in the artisanal industries of the most vulnerable people in Colombia.

Academia and Government



Industry



Communities



Partners



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BERSTIC International Projects in Education



ENCORE: Energizing coastal areas with offshore renewable energy

The aim of the ENCORE project is to advance five offshore renewable energy technologies in a structured and collaborative process, and to develop open source tools and services to facilitate the accelerated commercialisation of offshore energy solutions for islands, ports, estuaries and marine structures. Within this project, the Universidad Cooperativa de Colombia was an important participant through the LATAMA & European BERSTIC network where it supported the creation of e-learning courses on Offshore Renewable Energy for students of different engineering disciplines.



Partners



Deftiq Platform

Programme

International Certification of ORE technologies

Introduction to Offshore Renewable Energy

Financing and commercialising ORE technologies

Technology Development

Environmental Impact

Testing

Policy

Transport, installation and commissioning

Other BERSTIC Projects in Education

SDG-based learning in the engineering curricula of the Universidad Cooperativa de Colombia: Improving engineering skills in a developing country.



Identifying learning and teaching styles within the UCC



Modification of the curricula of UCC engineering programmes towards learning based on the challenges of the SDGs.

Develop group design projects (GDP) based on the challenges of the La Paz community and the MDGs.

Strengthen linkages between industry, communities, government and academia.

Transforming the voice of the SDG challenges faced by the Wayuu indigenous community of La Paz



Partners





Futuro sostenible



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DOM3E



NIBIO NORSK INSTITUTT FOR BIOØKONOMI



WARSAW UNIVERSITY OF LIFE SCIENCES

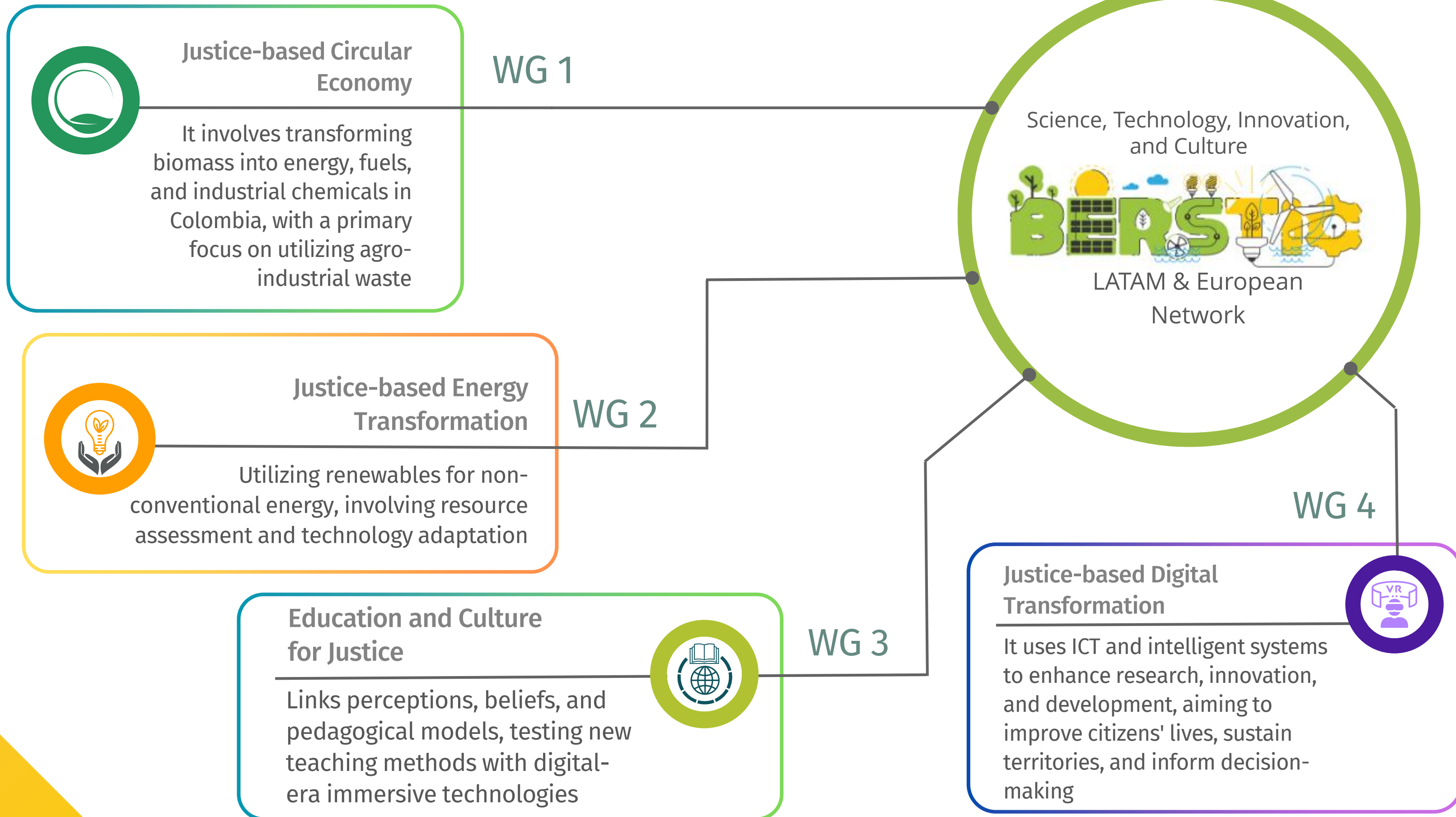


Institute of Physical Chemistry PAS



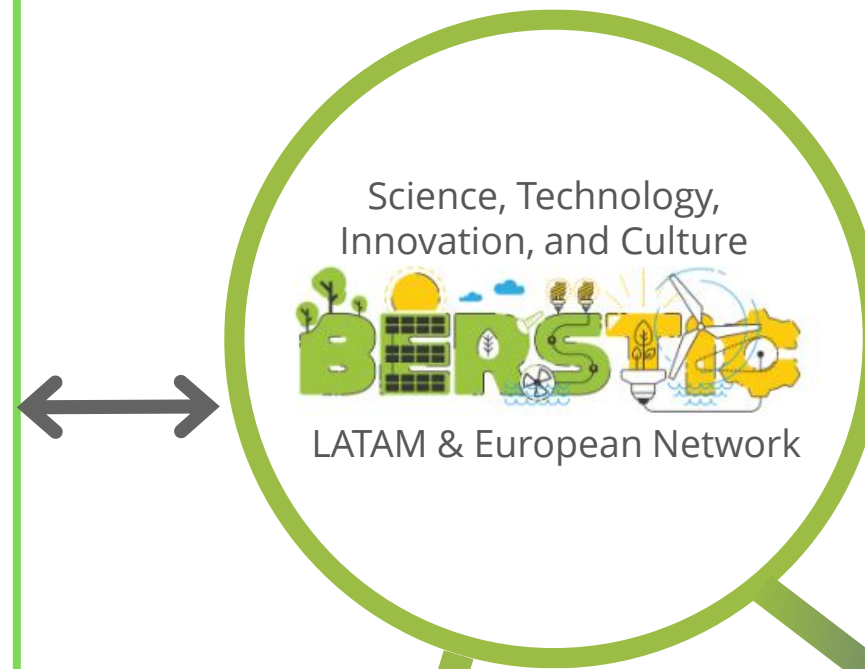
UNIVERSIDAD DE CÓRDOBA

Who are we?

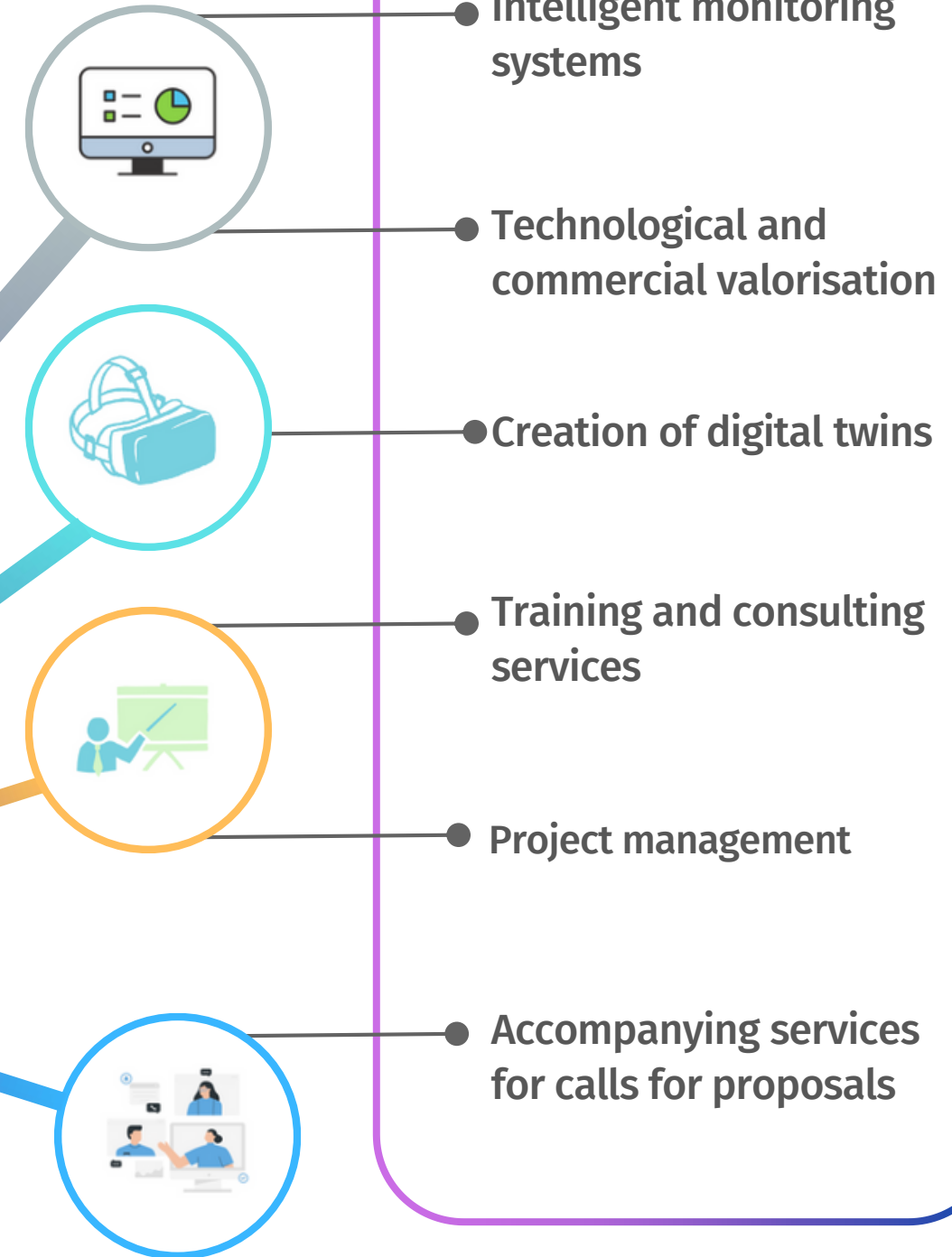


Connections with Colombia through the Engineering Research Institute (In³) and BERSTIC LATAM and European Network

BERSTIC Working Groups



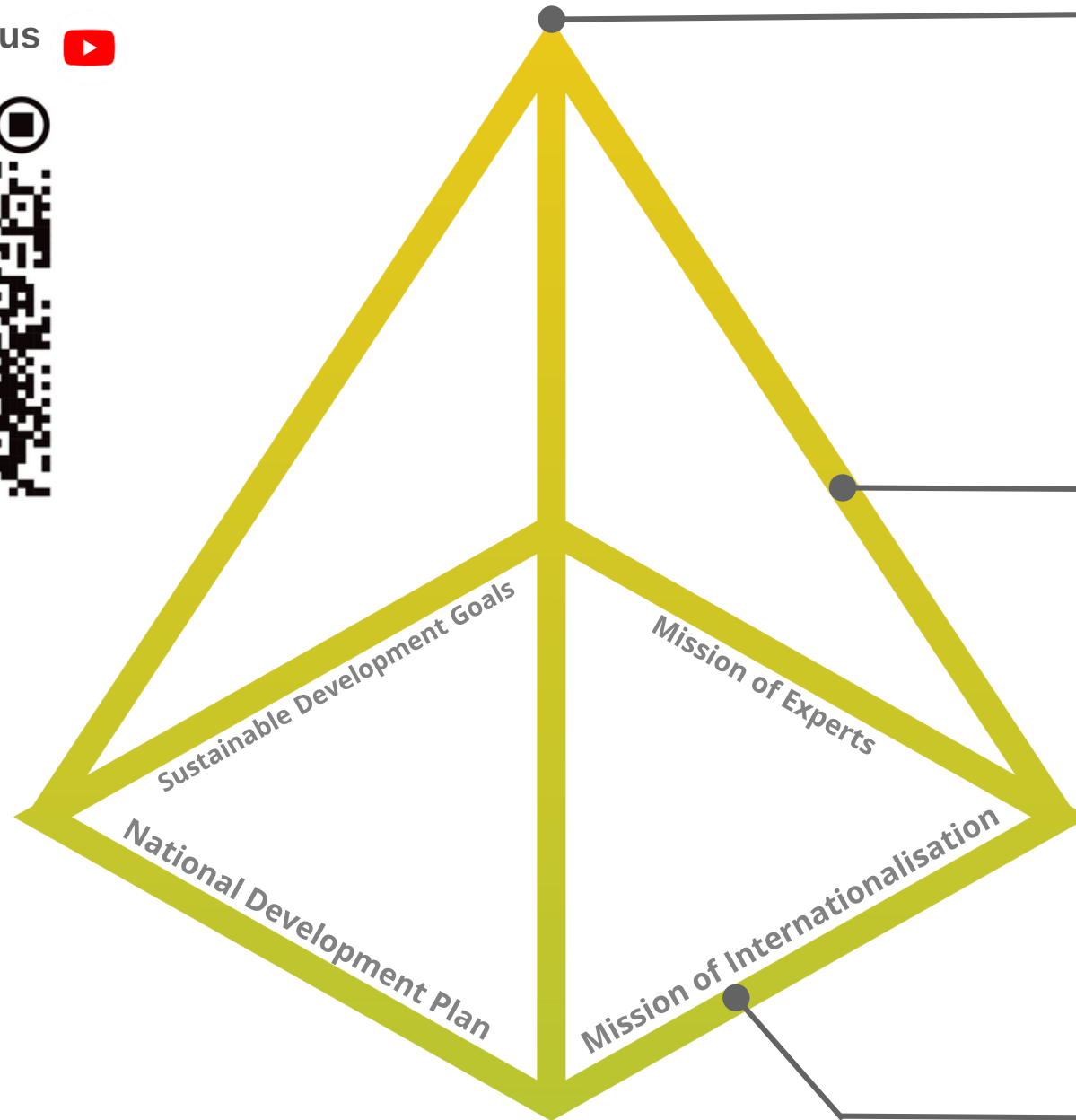
Service Portfolio



Objectives



Find out more about us 



To develop research projects in science, technology and innovation aimed at the development of the country with environmental, economic and social justice in mind, with financing from national and international funds



To train human capital capable of performing under the requirements of industry, government and communities through curricula and research projects created jointly between industry, national and international academia, communities and governments.



Develop and generate spaces for the social appropriation of science, technology and innovation based on the active participation of the various social groups that generate knowledge (industry, academia, society and government).



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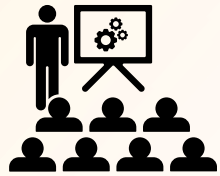
Scientific Diplomacy



Scientific diaspora



International cooperation networks



High-level academic and training programmes



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Upcoming BERSTIC Events



I International Congress on Biorefineries and Renewable Energies Supported by ICTs - BERSTIC 2018
Medellín, Colombia



II International Congress on Biorefineries and Renewable Energies Supported by ICTs - BERSTIC 2020
Bucaramanga, Colombia



III International Congress on Biorefineries and Renewable Energies Supported by ICTs - BERSTIC 2022
Medellín, Colombia



IV International Congress on Biorefineries and Renewable Energies Supported by ICTs - BERSTIC 2024
Warsaw, Poland

IV International Congress on Biorefineries and Renewable Energies Supported by ICTs - BERSTIC 2024

Building a Sustainable & Inclusive Future of Colombia based on Engineering Business Opportunities for Hydrogen Industry



La Guajira, Colombia - May

Warsaw, Poland - September



Research projects with community participation

School of weaving and knowledge

More than 100 students will participate.

Forums, co-creation workshops, seminars for undergraduate and postgraduate students with the participation of international experts

THANK YOU!



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LED BY:

Prof. Dr. Ramón Fernando
Colmenares-Quintero
CEO & Founder



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Contact via Email

Cooperation@berstic.edu.co