



Marine Aquaculture, Renewable Energy, Reefs & Ecotourism for Ecosystem Services (MAR²E³S)

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Sustainable Development and Climate Change Division, Asian Development Bank

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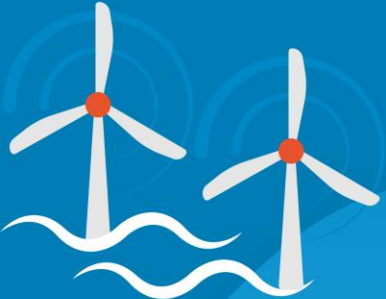
Regenerative Utilization of resources

- **DMCs current reliance on unsustainable linear extractive and low value industries and policy status quo**
- **Paradigm shift: creation of higher value industries with more local content and retained value in healthy oceans →**

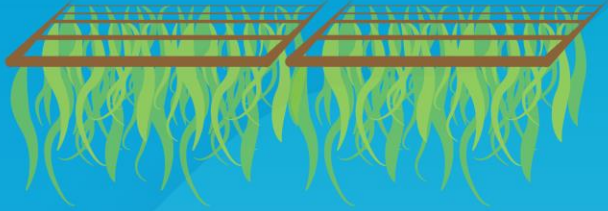
Regenerative Marine Industries

- ❖ Using marine renewable energy to make hydrogen and alternative fuels (ammonia, methanol, ethanol)
 - ❖ Creating export market for the hydrogen, accelerating global green hydrogen development
 - ❖ Using the fuels locally for transport and industry
 - ❖ Using the energy locally to accelerate nature-based defenses and marine aquaculture for domestic and export markets while regenerating the ocean surrounding the infrastructure whilst
 - ❖ Attracting high value tourism to see ocean regeneration in action.
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Developing regenerative marine business ecosystems



Hydrogen Fuel
for Local Marine Transport



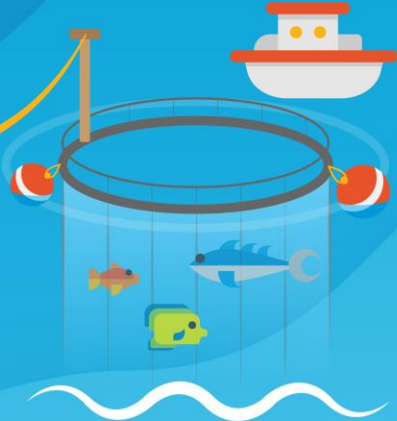
Hydrogen
Fuel for export



Solar, wind, tidal
and ocean energy



Electrolysis
Plant



Marine aquaculture and
cultivated reefs using
renewable energy for
regeneration of ecosystem

Ecotourism



Energy



Fuel for Marine
Transport & Export



Food



Regeneration

Aligned with ADB Action Plan for HEALTHY OCEANS & BLUE ECONOMIES

ADB Commitment: \$5 billion by 2024

Flagship Programs



Coastal Resilience



Marine Plastics



Ocean Finance and Blue Economy

Mainstreaming Oceans in Key Sectors



Ports and Shipping



Wastewater, Sanitation, Solid Waste Management



Agriculture and Water

MARES Components includes marine renewables, alternative fuels (H₂), Marine aquaculture, cultivated reefs, rigs to reefs, coastal resilience and eco-tourism

Existing Similar Approaches for Energy Only

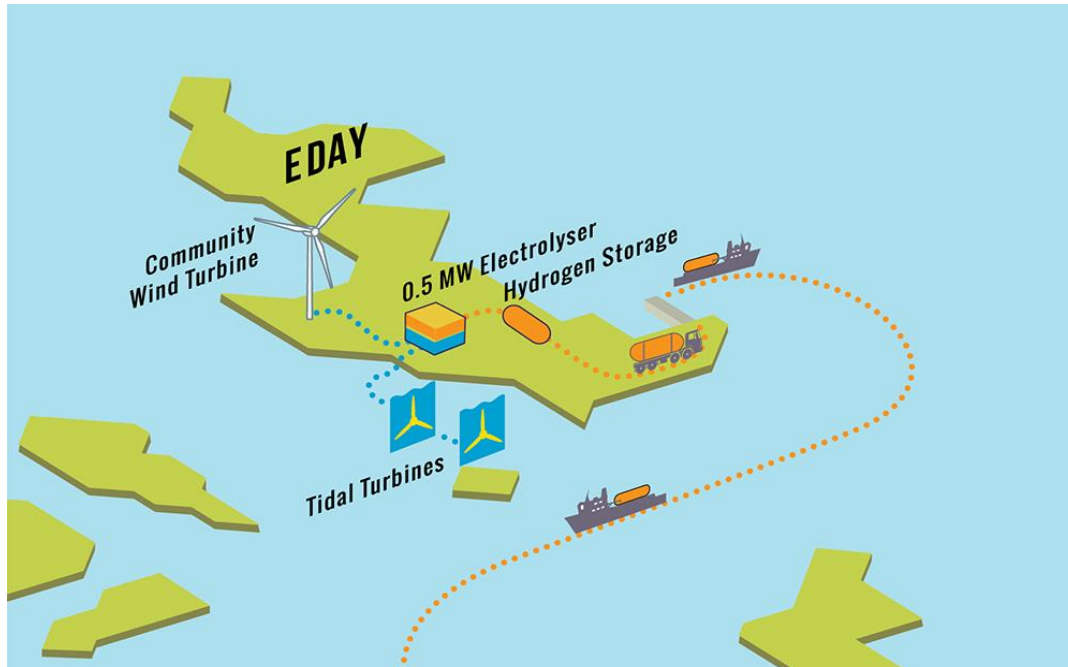
The use of marine energy to make hydrogen has been demonstrated successfully in the Orkney islands, Scotland. Orsted, Total and Siemens are expanding capacity in marine power to hydrogen.

<https://www.surfnturf.org.uk/>

Orkney Islands – Surf 'n turf hydrogen project

<https://www.climatechangenews.com/2020/08/24/orsted-backs-danish-offshore-wind-powered-hydrogen-project/nshore>

Orsted's offshore wind to onshore hydrogen project



Integrating Marine Renewable Energy in MAR²E³S



SEAVENTURES DIVE RIG, MABUL SABAH

Reefs come in many forms, including converted offshore energy infrastructure, and can be grown faster than natural reefs are dying

Using locally made energy for regenerative works to reduce ocean acidification, create livelihoods and clean the oceans



Advanced marine aquaculture output could be 100 times current global seafood consumption

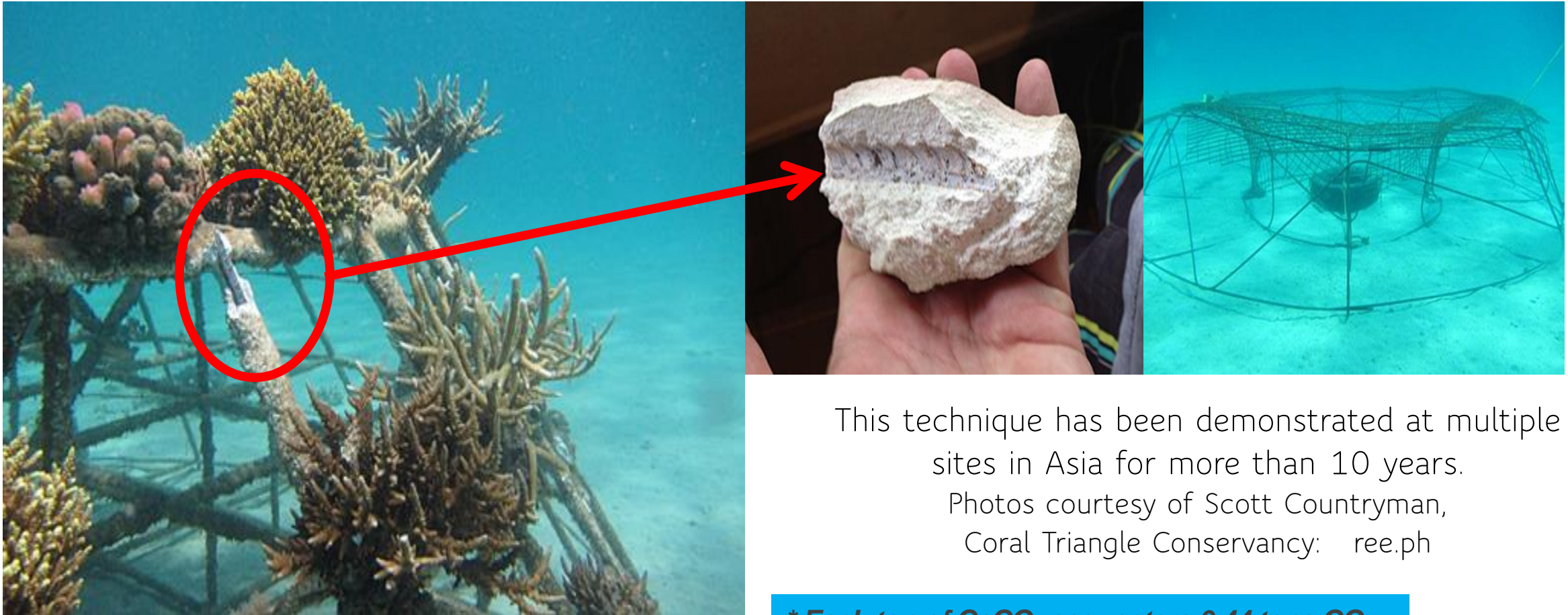


Ecotourism can be developed around cultivated reefs and integrated with marine aquaculture



Integrating Cultivated Reefs and Aquaculture

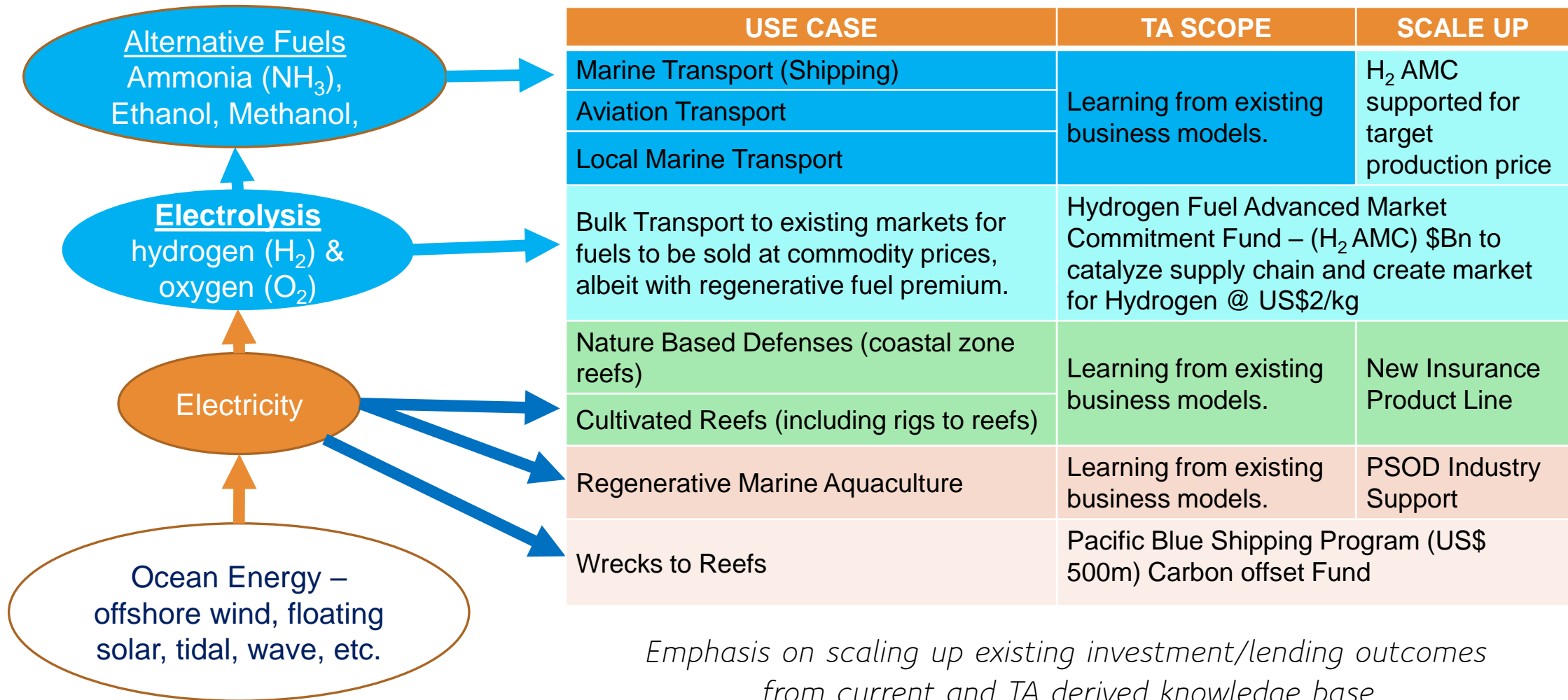
Limestone (CaCO_3) grown* using trickle charge electricity to augment coral propagation, nature-based defenses, and mitigate any energy infrastructure impact while directly mitigating local ocean acidification.



This technique has been demonstrated at multiple sites in Asia for more than 10 years. Photos courtesy of Scott Countryman, Coral Triangle Conservancy: reef.ph

*** Each ton of CaCO_3 sequesters 0.44 tons CO_2 .**

Scaling Up Regenerative Aspects to Supply Chain



*Emphasis on scaling up existing investment/lending outcomes from current and TA derived knowledge base.
Integrating nature-based defenses into mitigation of marine energy infrastructure*



Focus Areas



Ocean-Climate Nexus

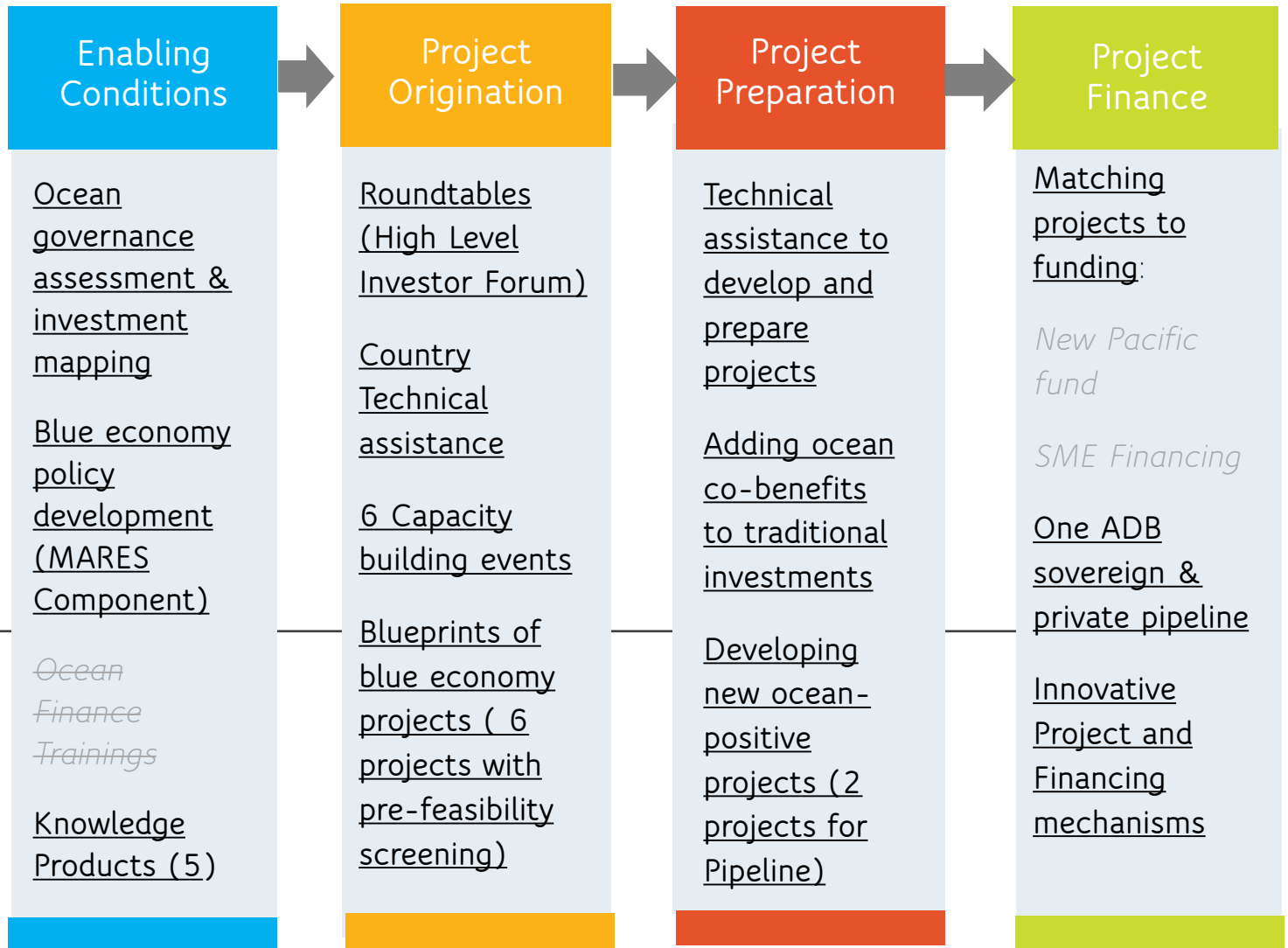


Circular Economy



Blue Foods

MARES Alignment underlined in bold



Expert Consultants



Rear Admiral Nick Lambert (Retd), Ocean Economy Expert [LinkedIn](#) [Rear Admiral Nick Lambert](#)

A master mariner and a committed proponent of the maritime users' perspective, Rear Admiral Nick Lambert concluded a long naval operational career as the UK National Hydrographer in December 2012. He advises on a wide range of maritime issues and the blue economy and is engaged in a variety of situational awareness, fisheries and aquaculture management, marine autonomous systems and vessel efficiency projects.



Scott Countryman, Cultivated Reef Expert [LinkedIn](#) [Scott Countryman](#)

Scott is an expert on the process of mineral accretion using marine renewable energy to grow limestone structures for marine habitats, coastal storm defence and breakwaters. His Nusugbu installation grows artificial reefs complementing offshore energy development. His work on MARES will highlight how regenerative industries can be aligned with marine renewable energy use. Integrating energy users to support regenerative activities



Gregor Hodgson, Marine Environmental Business and Development Specialist [LinkedIn](#) [Gregor Hodgson](#)

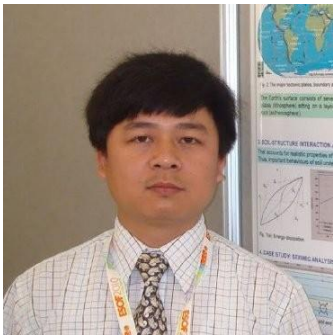
Gregor Hodgson is a marine biologist specializing in coral reef ecology and Coastal and Marine Spatial Planning. He is the Founder and former Executive Director of the global coral reef education, monitoring and management organization called "Reef Check" with operations in 60 countries. He has trained and helped establish national coral reef monitoring programs and Marine Protected Area networks in many tropical countries from Tobago to the Philippines. He holds PhD from the University of Hawaii at Monoa.

Expert Consultants



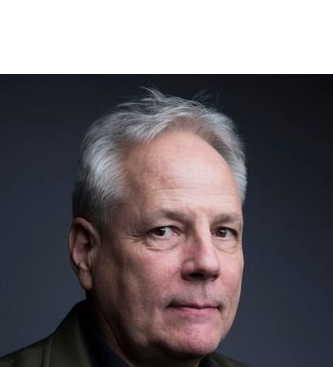
Dr Mike Abundo, Marine Renewable Energy Expert [LinkedIn](#) [Mike Abundo](#)

Mike has over 15 years in Marine Renewable Energy (i.e. Technologies and Project Development), innovation and Research, Development, & Demonstration (RD&D) Ecosystems, Supporting Industry, Academe, and Government collaborations in Digitalization+Sustainability, Blue Economy, and Sustainable Energy Transitions. Mike looks at the appropriate Marine Renewable Energy (Solar, Wind, Tides, Currents, Waves, Ocean Thermal, Salinity Gradients, Hybrid) . He provides a holistic and development pathways using Marine Renewable Energy. Mike looks beyond Techno-Economic metrics to assess candidate MARES projects.



Dr Nguyen Dinh, Marine Hydrogen Expert, [LinkedIn](#) [Nguyen Dinh](#)

Dr Nguyen Dinh holds a PhD from AIT and has worked for Wood, MaREI with extensive Post Doctoral engagement with Trinity College Dublin. He is a Senior Associate and Principal Consultant to OWC and is based in Cork, Ireland. Nguyen Dinh works on the current status of offshore hydrogen production developments and opportunities to produce ammonia and methanol for shipping and local communities. He provides the expertise to analyse marine hydrogen production and supply chains.



Dan Brian Millison, MARES TA Consultant [LinkedIn](#) [Dan Brian Millison](#)

Dan Millison of Transcendergy L.L.C. works on sustainable infrastructure investment programs. He is a passionate advocate for the sea and clean energy. Dan Millison works on the challenges and opportunities created by the declining Marine Environment.. By using Marine Renewable Energy as the entry point with complementary technologies and business models, Oceanic regeneration may be able to reverse ocean acidification but only through rapid decarbonization. Dan was the intellectual driver who developed the concept which became MARES.

Consultant Firm Expertise



Alex Rogers, Marine Scientist & Environmental Safeguards Specialist [LinkedIn](#) [Alex Rogers](#)

Alex is a marine ecologist interested in how biodiversity is distributed in the ocean, human impacts on the ocean and how to manage human activities to mitigate or reduce degradation of marine ecosystems. His work has taken him to the Atlantic, Indian and Southern Oceans and to the Caribbean investigating coral reef ecosystems, seamounts and deep-sea hydrothermal vents. Alex has worked with governments, intergovernmental and non-governmental organisations in publicising human impacts, especially those from deep-sea fishing and climate change, and on the development of policy solutions to such problems.



Andy Hamflett, Alternate Project Director [LinkedIn](#) [Andy Hamflett](#)

A journalist, researcher and expert fundraiser, Andy is a storyteller who helps organisations to articulate their needs and aspirations so they can set about meeting them. He has a particular penchant for fundraising and has raised several million pounds for socially responsible projects and organisations.

Andy also leads innovative research projects exploring the emerging potential of digital and data tools for social impact. He applies rigorous foresight research to immediate organisational challenges to inspire teams to develop solutions fit for the future. Andy will be available to assist when required.



Gary Hesling, Project Coordinator [LinkedIn](#) [Gary Hesling](#)

Captain Gary Hesling is a professional HM Royal Navy officer, master mariner and Category A hydrographer. His work focuses on the utility of advanced sensors, autonomous technologies and automated information systems to collect, collate, fuse, analyse and display marine and maritime data in game changing formats and services. Gary is a Senior Visiting Fellow at the National Oceanography Centre and is qualified as an APAEWE Expert Witness. Gary will be responsible for the flagship knowledge product, “Regenerative Marine Industry”.

Consultant Firm Expertise



Dr Jack Dyer, Marine Resource Economist [LinkedIn](#) [Jack Dyer](#)

Dr Jack Dyer is a specialist climate change, development and blue/ocean economist and has worked with UNDP on developing blue economy financing mechanisms, institutional capacity building, monitoring and evaluation frameworks for Barbados, Grenada, St Vincent and the Grenadines. He works across a broad spectrum of ocean and blue economy related areas from MPAs and renewable energy to blue economy strategies and ocean governance. Dr Dyer will be responsible for developing the assessment framework for MARES type projects.



Fabian Iyar – MARES National Coordinator and Social Sector Specialist for Palau

[Linkedin](#) [Fabian Iyar](#)

Fabian was born and raised in Palau. Fabian has over 20 years of professional experience in leadership, managing teams and advising on projects in the fields of conservation, public health, finance and tourism. He provides the lead on the ground support for the MARES TA in the Republic of Palau, Fabian has a Bachelor's Degrees in International Business & International Tourism; MBA in Business Administration focused in Business Administration and Management, General from University of Guam.



Ivory Vogt, Sustainable Travel International Ecotourism Specialist [LinkedIn](#) [Ivory Vogt](#)

As a Palauan, Ivory is especially concerned about the way climate change and tourism are impacting the livelihoods and environments of island nations. She works in sustainable tourism, creating livelihoods for people and preserving local cultures. Ivory works as the Program Manager for Climate & Resilience at Sustainable Travel International where she helps businesses and island destinations measure, reduce and offset their carbon emissions.

Consultant Firm Expertise

Don Hess, National Coordinator Marshall Islands

Hess semi-retired in 2016 after more than 20 years of working in the environmental and marine science field at the College of Marshall Islands (CMI). He served as Vice President for Academic and Student Affairs and taught courses primarily in marine and environmental sciences. Currently Hess is engaged in marine science education and grant writing/management on climate change and conservation in the Marshall Islands, notably on coral reef management, restoration, community projects and sewage outfall projects. He serves on the board for the Marshall Islands Conservation Society.

Setoki Qalubau, Social Sector Specialist Marshall Islands [LinkedIn](#) [Setoki Qalubau](#)

Setoki teaches History, Politics and Sociology for the RMI USP joint education program at the University of the South Pacific Majuro Campus. A former civil servant for the Fiji Government, he was involved in the establishment of a National Inventory for iTaukei Traditional Knowledge & Expression of Culture (TKEC) as part of the Cultural Mapping Program. Setoki also engaged in national and regional efforts in the development of a legislation to safeguard national TK&EC and inventories. He was also a consultant for the UN consulting and training on Traditional Knowledge and Cultural Expressions (TK&EC) in the Asia Pacific region.

Sabina Rustamova-Aliyeva, Social Safeguards Specialist [LinkedIn](#) [Sabina Rustamova-Aliyeva](#)

Sabina is a social and gender specialist with wide cross cultural experience in various research, gender, social impact, community development and evaluation projects. Her has completed research projects in the South Caucasus and Central Asian countries funded by many international organisations including WB and ADB. These projects have included studying social impact issues, social safeguards and gender mainstreaming in infrastructural and development projects in collaboration with National State agencies.

Activity Summary

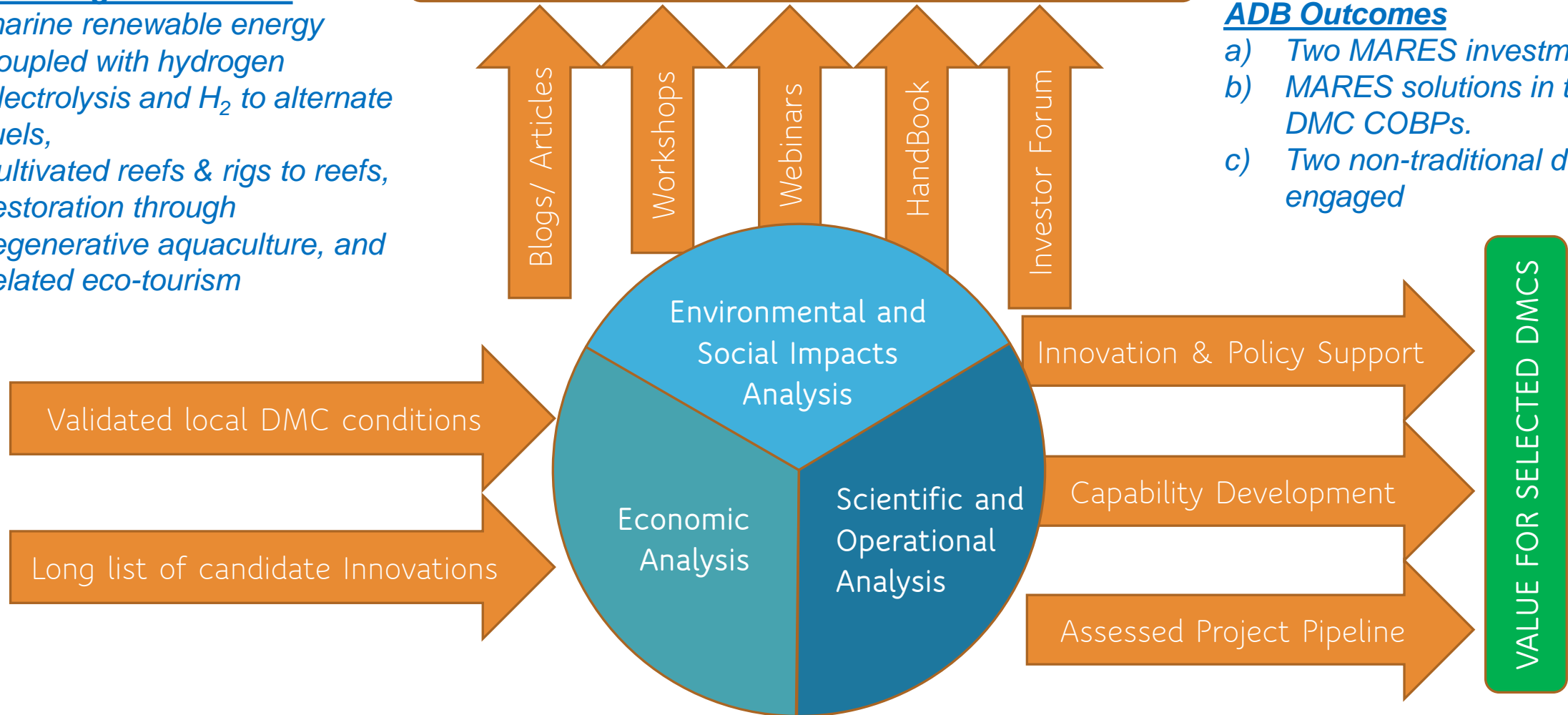
MARES Integration Focus

- (i) marine renewable energy coupled with hydrogen electrolysis and H₂ to alternate fuels,
- (ii) cultivated reefs & rigs to reefs,
- (iii) restoration through regenerative aquaculture, and
- (iv) related eco-tourism

VALUE FOR BROADER STAKEHOLDER COMMUNITY

ADB Outcomes

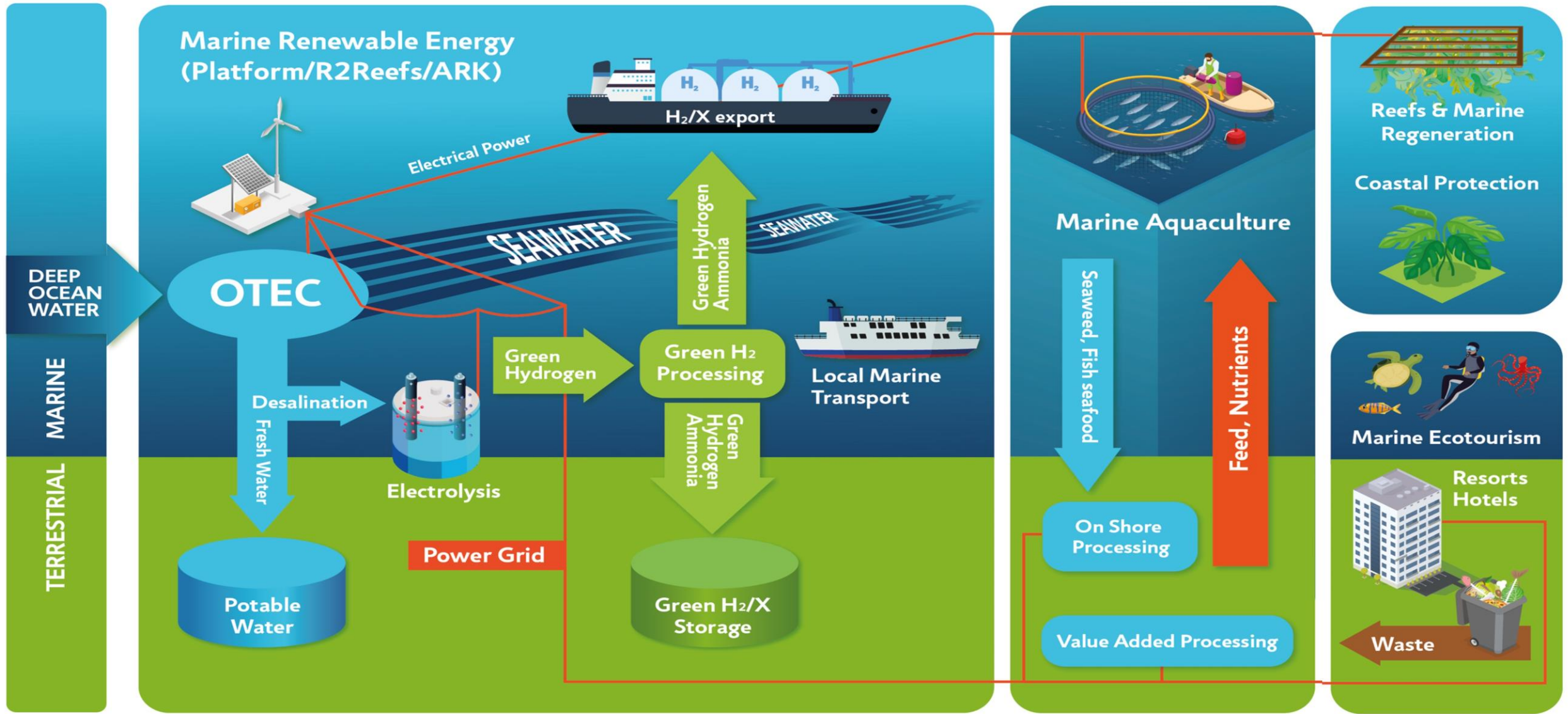
- a) Two MARES investments
- b) MARES solutions in two DMC COBPs.
- c) Two non-traditional donors engaged





High Level Investor Forum (HLIF) in Kuala Lumpur, 7 February 2023 with over 125 participants from government, energy and infrastructure developers, investors, blue economy businesses types and community groups gathered together to discuss how to realize a “New Ocean Energy Economy” as part of a just transition. Link [here](#).

MARES - Multifunction Approach





Thank You

Our data room has more information at <https://events.development.asia/learning-events/adb-data-room-marine-aquaculture-reefs-renewable-energy-and-ecotourism-ecosystem>

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