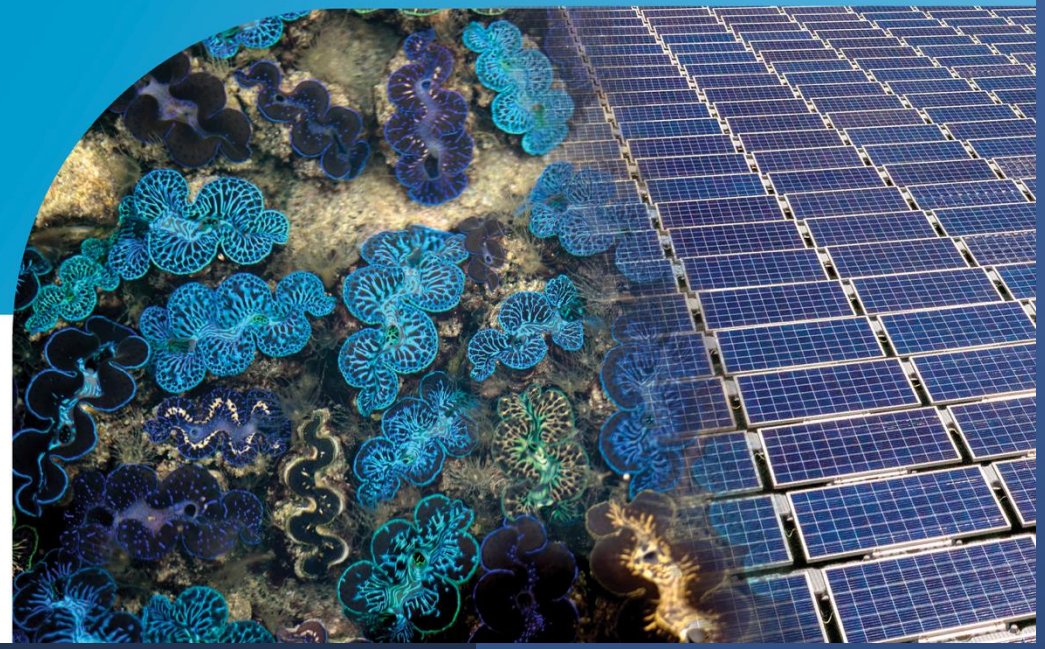
WAVES OF CHANGE

Harnessing Technology to Power the Sustainable Blue Economy

Workshop Two
25–28 May 2026 • Busan, Republic of Korea

ADB

Ministry of Oceans and Fisheries



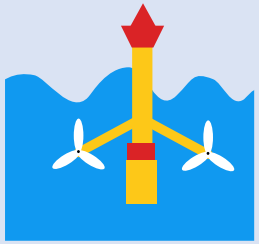
Session 6 Context

Session 6 focuses on emerging ocean-positive renewable energy solutions, including offshore wind, tidal and wave power, and floating solar.

The session explores how these technologies support decarbonization, reduce pressure on marine ecosystems, and strengthen coastal resilience.

What “blue power” means

Offshore wind/Floating offshore wind.



Tidal/Wave energy

Floating solar on reservoirs, dams, lakes, and sheltered waters.

Hybrid coastal systems using renewables, storage, microgrids, desalination, cold storage, ports, or aquaculture

Asia-Pacific relevance

Many coastal and island DMCs face high imported fuel costs.

Many have limited land for solar or onshore wind.

Many face typhoons, storm surge, sea-level rise, and coastal erosion.

Many need reliable energy for ports, cold chains, tourism, desalination, aquaculture, and island communities.

Pacific SIDS need about 1.8 GW of additional renewable capacity and about $5.9 billion in investment to meet NDC targets.

Technology family 1: offshore wind

Most mature ocean-based renewable energy technology

Relevant for countries with large wind resources and growing electricity demand.

Fixed-bottom offshore wind works best in shallower waters.

Requires grid planning, port upgrades, vessels, seabed leasing, environmental safeguards, and bankable offtake arrangements.

Floating offshore wind can open deeper-water sites.

Technology family 1: offshore wind

Case Studies

Greater Changhua 1 & 2a, Taipei,China

900 MW operating offshore wind project developed by Ørsted. Useful example of large-scale offshore wind linked to grid connection, ports, local supply chains, and long-term power purchase arrangements.

Donghai Bridge Offshore Wind Farm, PRC

102 MW operating offshore wind farm near Shanghai and China's first commercial offshore wind project. Useful example of early-stage offshore wind market development in Asia.

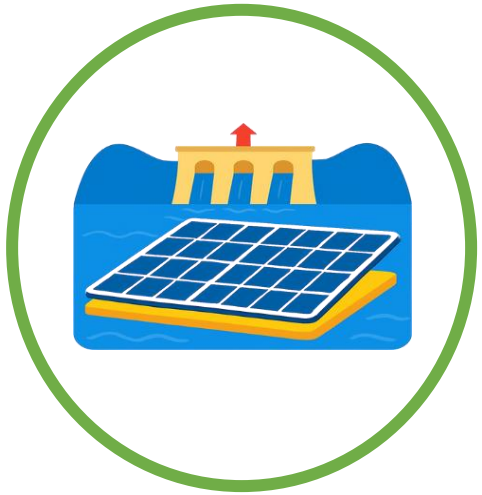
Hywind Tampen, Norway

88 MW operating floating offshore wind farm powering offshore oil and gas platforms. Good example of floating wind in deep water and using blue power for hard-to-abate offshore infrastructure

Technology family 2: floating solar

Practical for land-constrained coastal and island economies

Can be installed on reservoirs, hydropower dams, lakes, wastewater ponds, and sheltered waters



Can use existing grid connections

Can reduce land acquisition issues

Needs careful assessment of water quality, fisheries, biodiversity, navigation, typhoon risk, mooring safe

Technology family 2: floating solar

Case studies

Tengeh Reservoir Floating Solar Farm, Singapore

60 MW operating floating solar project on a drinking-water reservoir. Good example for dense coastal cities where land is scarce and reservoirs can support clean power.

Cirata Floating Solar Plant, Indonesia

192 MW operating floating solar plant on Cirata Reservoir in West Java. Strong example of using an existing hydropower reservoir and grid connection to scale solar without major land acquisition.

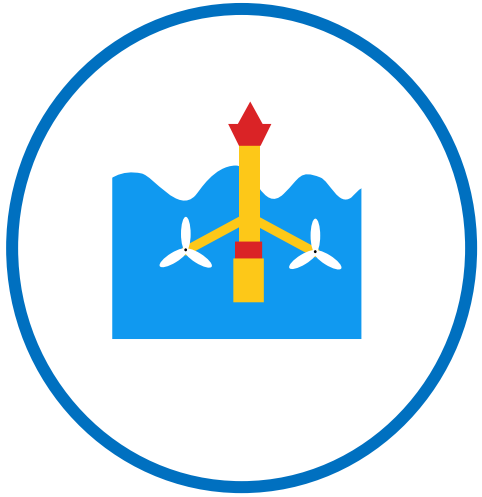
Sirindhorn Dam Hydro-Floating Solar Hybrid, Thailand

45 MW operating floating solar project integrated with hydropower at Sirindhorn Dam. Good example of hybrid operation, using solar in the day and hydropower to balance supply

Technology family 3: tidal/wave energy

Emerging ocean-based renewable technologies for islands and coastal systems

Supports island and remote coastal energy systems but Global ocean energy capacity remains relatively small (~494 MW)



Can power microgrids, ports, desalination, and coastal infrastructure

Tidal energy is highly predictable but site-specific. Wave energy is promising for island contexts but still commercially emerging

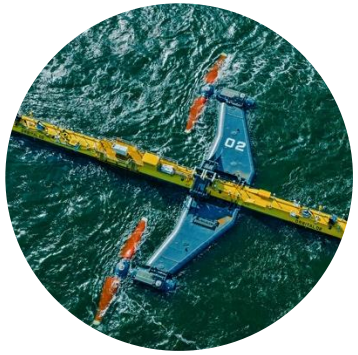
Requires careful site selection, safeguards, and maintenance planning

Technology family 1: tidal/wave energy

Case Studies

Sihwa Lake Tidal Power Station, Republic of Korea

254 MW operating tidal power station using an existing seawall. Good example of linking renewable energy generation with coastal infrastructure and water-quality improvement.



Orbital O2 Tidal Turbine, UK

Operating 2 MW floating tidal turbine connected to the local grid. Useful example for island systems where predictable tidal power can complement wind, solar, storage, or hydrogen.

Mutriku Breakwater Wave Plant, Spain

296 kW operating wave energy plant integrated into a harbor breakwater. Good use case for ports and coastal protection structures where wave energy can be built into existing marine infrastructure

Technology family 4: hybrid systems

For many DMCs, the best option may not be one technology alone

Potential combinations include:

- floating solar plus hydropower
- solar plus storage for islands
- wave plus batteries for remote facilities
- offshore wind linked to green ports

- renewables powering fisheries cold chains
- renewables linked to desalination and water security
- renewables supporting aquaculture and coastal tourism

Technology family 4: hybrid systems

Case Studies

Ta'u Island Microgrid, American Samoa

Operating solar-plus-battery microgrid with 1.4 MW solar and 6 MWh battery storage, reducing diesel dependence for a remote island community. Good Pacific-relevant example of clean power for isolated islands where fuel imports are expensive and unreliable.

Tokelau Renewable Energy Project, Tokelau

Operating solar-plus-battery systems across Tokelau's atolls, designed to replace most diesel generation. Strong small-atoll example for land-scarce Pacific countries needing resilient, community-scale energy systems.

King Island Renewable Energy Integration Project, Australia

Operating hybrid system using wind, solar, batteries, flywheel, demand management, and diesel backup. Useful example for isolated grids aiming for high renewable penetration while maintaining reliability.

What makes blue power ocean-positive

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- It reduces greenhouse gas emissions.
- It avoids sensitive marine habitats.
- It respects fisheries, navigation, tourism, and cultural uses.
- It consults and benefits coastal communities.
- It is resilient to typhoons, corrosion, sea-level rise, and storm surge.
- It has a credible operation and maintenance plan.
- It is financially viable beyond the pilot stage.

Which solution works for you?

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Which solution solves a real national problem, can be financed and maintained, avoids ecosystem harm, benefits communities, and strengthens resilience?

The future is blue power

The future is blue power, but not every blue power technology fits every country.

Blue power is not just about producing electricity. It is about using renewable energy to support coastal resilience, energy security, emissions reduction, sustainable infrastructure, and ocean-positive development.

Blue power must be planned carefully so it does not create new harm to marine ecosystems, fisheries, coastal communities, or tourism assets.