

White paper

Climate-positive marine developments

Marine ecosystems accommodate for beautiful biodiverse habitats and provide many valuable services such as aquaculture, renewable energy generation, tourism and coastal protection. Worldwide, however, marine ecosystems are under severe pressure due to human activities and climate change. Marine development projects that are being implemented in these ecosystems (like ports, artificial islands and other coastal developments) create additional pressure to already weakened ecosystems. That is why marine development projects are now being designed to minimize the negative impact on the environment. As a next step, the industry strives to climate-neutral interventions. In this white paper, we state that it is possible to design marine developments in a climate-positive way, by actively increasing biodiversity and carbon sequestration within the project. Moreover, we need to apply this climate-positive approach on a large scale to protect marine ecosystems from large-scale degradation, to mitigate climate change and to protect livelihood of coastal communities worldwide.

What are climate-positive marine developments?

Climate-positive marine developments are multi-purpose solutions to human needs that also contribute to robust marine ecosystems and help mitigate climate change impacts. Combining multiple objectives they address multiple societal challenges such as providing infrastructure, renewable energy generation, attracting tourists and providing livelihood for local inhabitants. Additionally, climate positive marine developments contribute to increasing the robustness of marine ecosystems through improving the quality of marine habitats and as such help facilitate the provisioning of the valuable ecosystem services. They may allow for active carbon sequestration or can be designed in such a way that greenhouse gas emissions are net-zero.

Why work on climate positive marine developments?

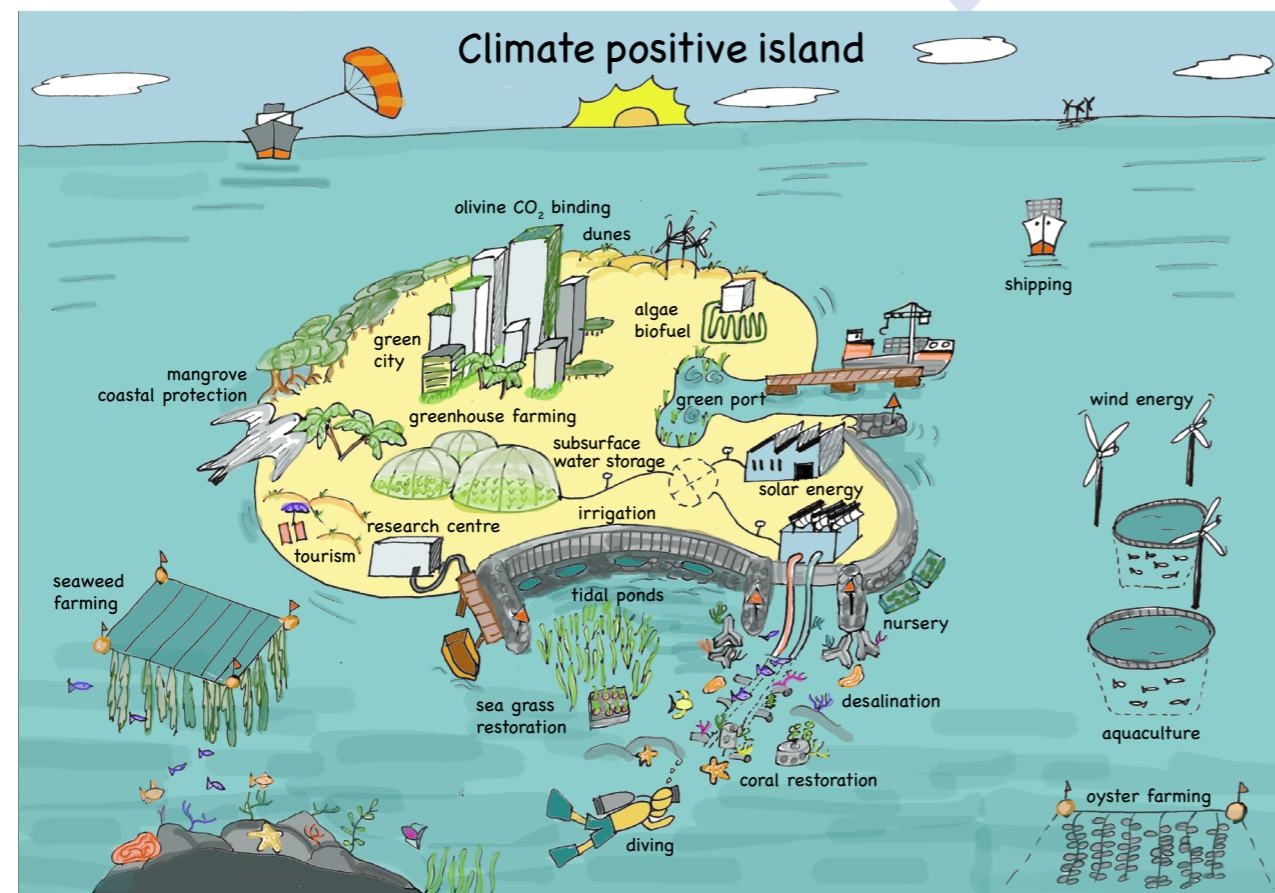
Valuable marine ecosystems with important ecosystem services are under threat worldwide due to human activities and climate change¹. There are many reasons to work on climate-positive marine developments:

- Induced changes such as coral bleaching, general biodiversity loss and specifically the diminishing fish stock affect industry and local communities in their livelihood.
- Climate change leads to extinction of 10% of the fish species and a rapid decline of coral communities in the ROPME Sea area (Gulf region) (ROPME policy brief).
- Human population growth and increased risk of natural hazards ask for solutions to safeguard energy supply, food provision, fresh water resources and protection of coastal zones against storms and floods.
- Marine development projects that are currently being implemented in these ecosystems to provide in e.g. energy supply or distribution of goods, however, often create additional pressure to already weakened ecosystems instead of strengthening them.
- upscaling CPMD will contribute to larger scale robust marine ecosystems.

¹ IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services), 2018. Summary for policymakers of the regional assessment report on biodiversity and ecosystem services for Europe and Central Asia of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Fischer, M. et al. (eds). IPBES Secretariat, Bonn, Germany.

Transforming Business-as-Usual to Climate-Positive Marine Developments

In a Business-as Usual scenario new marine developments are predominantly designed for a single dedicated purpose. The Climate-Positive Marine Development philosophy strives for a wider, more holistic view on marine developments, by including sectors that may be outside the regular set of involved stakeholders. For example, through inclusion of sectors such as aquaculture, renewable energy and tourism a location that was only intended to serve as a port becomes a lively place for multiple users and creates changes to improve natural functioning and biodiversity values.



Naming the benefits of CPMD

The benefits of CPMD are multitude, some are mentioned here:

- Multiple users can live and work together in a newly developed area
- Including a focus on robust natural functioning benefits the appreciation of the environment and the general well-being of the people living there
- CPMD avoids further stress on the marine ecosystems, rather it stimulates it, thereby providing more ecosystem services
- CPMD thinking helps businesses reaching their environmental goals while benefiting their own primary needs

Examples of CPMD

There are many opportunities to improve business as usual developments towards a climate-positive approach.

Examples contributing to specific aspects of an overall climate-positive plan can be:

- designing desalination infrastructure in such a way that it contributes to coral restoration or creates new habitat for marine life.
- stimulating habitat restoration that also serves a coastal protection such as sea grass, dunes and mangrove forests.
- using olivine as building material to sequester CO₂
- restore robustness of marine ecosystems so they can continue to provide ecosystem services such as aquaculture, seaweed farming, renewable energy generation, restoration of fragile habitats and coastal protection with green and soft foreshores.

Enabling the shift towards climate-positive marine developments requires an interdisciplinary approach

Successful implementation of climate-positive marine developments is not straightforward and requires system understanding, interdisciplinary development of multi-functional designs, innovative financial and institutional arrangements and joint forces of all sectors involved.

1. System understanding at the core of CPMD

Because climate-positive marine developments strengthen the local ecosystems, the design has to be context specific. It is subject to the local physical and ecological system, such as a muddy mangrove coastline or a rocky coral reef. System understanding is key to implement a climate-positive approach. Only by taking current and desired ecological functioning into account when designing the marine development, it can contribute to strengthen the local marine ecosystem and its ecosystem services. For example, the conditions for natural regeneration of the marine ecosystems like wave energy, sediment characteristics and water quality should be maintained. System understanding can be expanded through joint monitoring efforts both before, during and after implementation.

2. The socio-economic and institutional system are fundamental in providing the stimulating and facilitating framework for implementation,

so that the design fits in the local governmental objectives and contributes to the local societal and economic needs. Innovative institutional arrangements are needed for a large-scale uptake of climate-positive marine developments. By making climate-positive approach part of policy and regulations, the uptake and scaling-up of this approach will be facilitated. Moreover, awareness on climate-positive marine development should be raised in enforcement agencies and with the general public. Other activities include involvement of a large range of stakeholders in marine developments, building a community of practice to share knowledge and experiences, and raising awareness through education of key stakeholders and beneficiaries of climate-positive developments, including the local community e.g. the tourism and fisheries sectors.

3. New financial strategies and solutions can close the gap between desire and reality

The financial sector plays an important role in scaling up climate-positive marine developments, through finding investment opportunities, adjusting procurement processes and broadening business cases. Closing the gap between strategic planning and investment planning will facilitate larger-scale implementation of climate-positive marine developments. Opportunities include involving private sector investments in a blended finance framework, creating demand for investment through collective investment governance structures, and



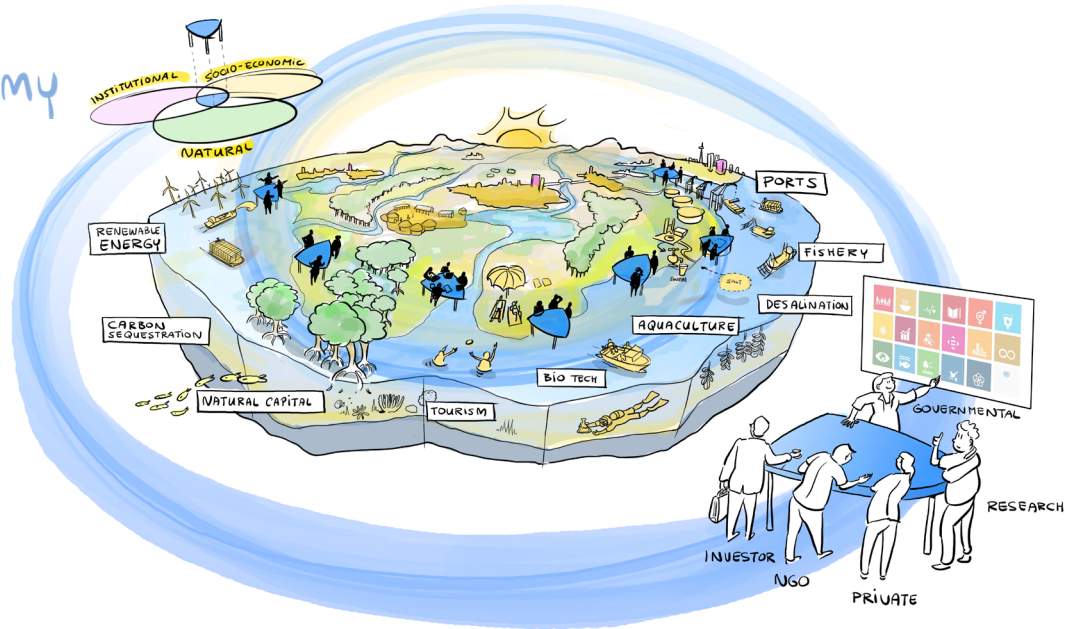
adopting SDG-related indicators for investments. In procurement processes, environmental factors should be considered already in the pre-tender phase to allow for more climate-positive designs to be considered in the tender phase. Business cases of marine developments should align the project benefits with all the possible beneficiaries. This will convince the developer about the long-term positive economic effects. Developing and pitching business cases to different stakeholders (how to create value and or save costs) will help to build trust and de-risk projects.

4. An interdisciplinary approach to the implementation process and design is of vital importance

Climate-positive designs are multifunctional and are developed with an interdisciplinary approach. By combining multiple objectives in one integral marine development project, the intervention is more efficient than executing different projects in parallel. To successfully combine these objectives in a design that fits into the local ecosystem, an interdisciplinary approach is of vital importance. Insights from ecology, technology, governance, finance and socio-economy are integrated to find climate-positive solution that are tailor-made for that specific environment. Through integrating ecosystem services into engineered project designs, more benefits can be delivered to local communities and other stakeholders. Furthermore, artistic dimensions can be used in the design to find creative solutions for marine developments.

Because climate-positive marine developments are multifunctional and demand an integrated approach, joining forces between different sectors is key for successful and large-scale implementation. This can be achieved by forming public private partnerships, organizing interdisciplinary dialogues and designating champions in that advocate for a climate-positive approach in the sectors of industry, financial sector, governmental organizations and universities.

SUSTAINABLE BLUE ECONOMY



Call to action

Our call to action is to initiate and scale up climate-positive marine developments. Developing in the marine environment in a climate-positive way goes beyond business-as-usual developments. It will create large opportunities to strengthen marine ecosystems. We argue that the initiator of new developments is not necessarily a government or where legislation creates a ‘must-do’ approach



Courtesy of De Rijke Noordzee & ARC Marine

to developments, but that industry plays a leading role by initiating co-creation with governments, NGOs and knowledge institutes to develop and implement climate-positive solutions in marine development projects. A first step is to approach new marine development projects in a climate-positive way and with a ‘want-to-do’ mind-set and to create an overall win-win situation.

In all relevant sectors, champions can facilitate engagement with multiple and diverse stakeholders to enhance ownership and build trust. Events (e.g. workshops) help raise awareness and educate stakeholders regarding climate-positive marine developments. A community of practice to share knowledge and experience will facilitate networking, connecting innovators and demand side. From this concrete pilot, projects must be developed to demonstrate the added value of this concept.

When we design marine developments in a true climate-positive way, they will create more biodiversity, habitats and climate resilience and therefore be beneficial to everyone.

Colofon - creating momentum

The pledges of countries worldwide to reduce their greenhouse gas emissions to net-zero, provide a window of opportunity to scale-up climate-positive marine developments. That is why an event was organized to create momentum on the topic of climate-positive marine developments at the NL Pavilion on the World EXPO 2020 in Dubai on 6 October 2021. On that occasion, thought leaders from different backgrounds and a diverse group of stakeholders discussed the following question: “How can we realise marine developments with a climate-positive approach, finding multi-purpose solutions that contribute to robust marine ecosystems and help to mitigate climate change?”

The objective of this white paper is to inspire climate change researchers, project developers, ports authorities, power & desalination industry and offshore industry, governments, environmental authorities, and NGOs to adopt the climate positive approach in new marine development projects.

Besides these recommendations, the authors of this white paper and the attendees of the event state that proactive co-creation of industry, government, NGOs and knowledge institutes is needed to mainstream a climate-positive approach mainstream for marine developments.

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