Offshore Renewable Energy (ORE)

N4M - Necessity, Narratives, Benefits and Side Effects of ORE

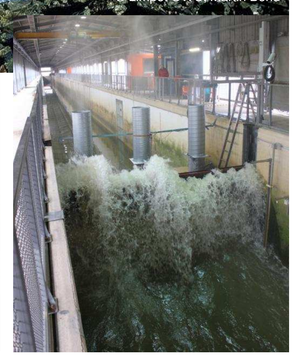
Problem statement and rationale of N4M

- Transformation of the global energy system is essential to achieve targeted climate protection goals (#netzero) and demand for a massive push in clean electrification and energy innovations.
- Demands for the development and sustainable deployment and operation of low emissions technologies that today are at the demonstration or prototype stage are high.
- Current shares of reliable and clean Offshore Renewables Energies (ORE) are two orders of magnitude smaller than annual production from hydro, wind or solar power. Yet, technologies are in their infancy and far from being commercialized or mass-produced.
- Necessity of a novel research mission N4M operated by the German Marine Research Alliance (DAM) by means of ORE technology development and novel pathways of trans-disciplinarity by launching knowledge and technology transfer activities.

SR2000: 2 MW installed power
Tidal current floating paltform
Testphase EMEC, Orkney
https://orbitalmarine.com/

LIMPET OWC, 500 kW, Isle of Islay, Glasgow, Schottland
Tests im GWK Hannover (2014-15)

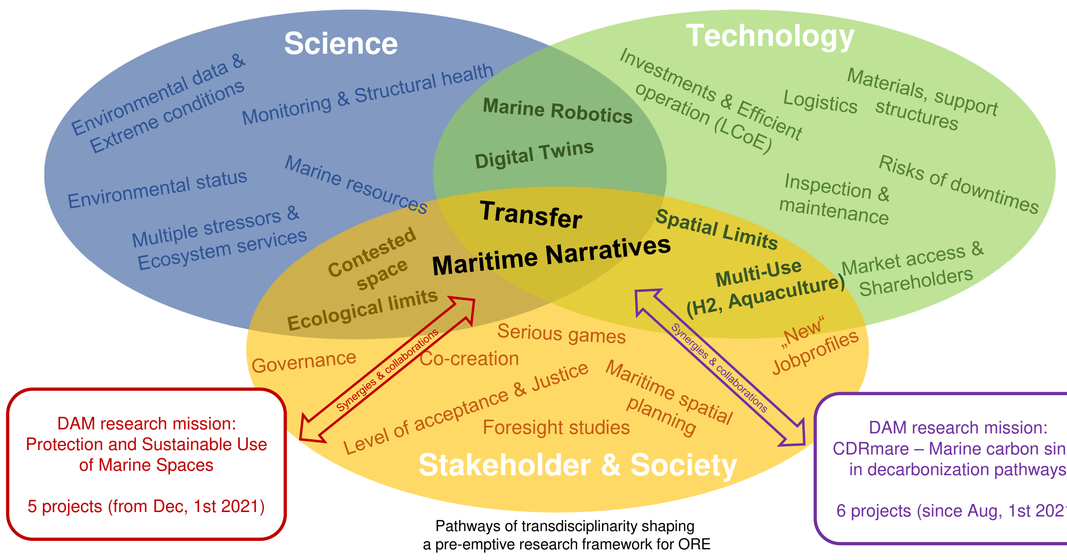
SinnPower 12x12x6m moored floating units (wave power / multi-use)
Testphase Kreta, Griechenland, Tests WSBM Hannover (2018-19)
https://www.sinnpower.com



Technologies and pathways of transdiciplinarity

- ORE technologies and devices include the generation of electricity from wind (e.g. ground-based and floating), waves, currents, tides, and floating solar photovoltaic plants following from ambitious political goals, i.e. EU Green Deal to install 300 GW offshore wind and 40 GW ocean energy by 2050.
- Related infrastructure, i.e. grid connections, co-utilization of spaces (“multi-use”) or combining electricity and hydrogen production, artificial energy islands, and combinations with aquaculture, fisheries or carbon storing ecosystem components are integral part of any future ORE strategy and narrative.

- Societal narratives for the development and benefits of ORE are underdeveloped and compete with other maritime narratives – notably nature conservation. Therefore, discussing sustainable energy narratives for inclusion into marine use discourses and planning efforts shapes a pivotal part of this envisaged research mission.
- This mission spans a unique Research and Innovation Ecosystem (High-Tech Strategy 2025), in which a demand-driven thematic field with huge scientific potential to progress the development of technologies and open up markets in the maritime energy sector is combined with evidence of necessity, societal narratives, socioeconomic benefits and ecological side effects. N4M facilitates new fields of research in, e.g.:
  - Provision of high-resolution environmental data for yield estimates, installation, operation and maintenance concepts
  - Scenario simulation and optimization of energy production and minimizing side effects on marine ecosystems
  - Analyses of equity issues and maritime narratives and involvement of societal actors (co-design) to elaborate development pathways
  - Development of smart monitoring systems (AI) and autonomous maintenance concepts through supporting use of marine robotics
  - Creation of digital twins for infrastructures in operational use to estimate material fatigue and structural deteriorations



Pathways of transdisciplinarity shaping
a pre-emptive research framework for ORE

Next steps towards N4M

- Research mission N4M is established on a 8-10 years design. Research activities are funneled into projects and outcomes are streamlined into transdisciplinarity approaches, advancing transfer and output by delivering practical application and co-operation with industrial, societal and administrative partners.
- Being inactive in the field of ORE in marine science entails the risk that no influence can be exerted on the development and implementation of key technologies at the international level.
- German Marine Research Alliance (DAM) fully endorsed mission concept and proposed funding to BMBF in close correspondence with other federal ministries, i.e. BMWK, BMUV, BMDV.

Kontakt:
Torsten Schlurmann, schlurmann@lufi.uni-hannover.de
Nils Goseberg, n.goseberg@tu-braunschweig.de
Arndt Hildebrandt, hildebrandt@lufi.uni-hannover.de
Stefan Schimmels, schimmels@fzk.uni-hannover.de
Alexander Schendel, schendel@lufi.uni-hannover.de

Forschungszentrum Küste (FZK)
Gemeinsame Einrichtung der Leibniz Universität Hannover und der Technischen Universität Braunschweig
Merkurstr. 11
30419 Hannover
www.fzk.uni-hannover.de/