Bridging the gap – market interventions for commercial marine energy deployments

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Current Funding for wave/tidal projects

The current funding aims to drive down the cost of electricity generation prior to commercial installations. In particular survivability and reliability of devices are imperative because of the high cost of catastrophic failures and periods of unavailability [1].

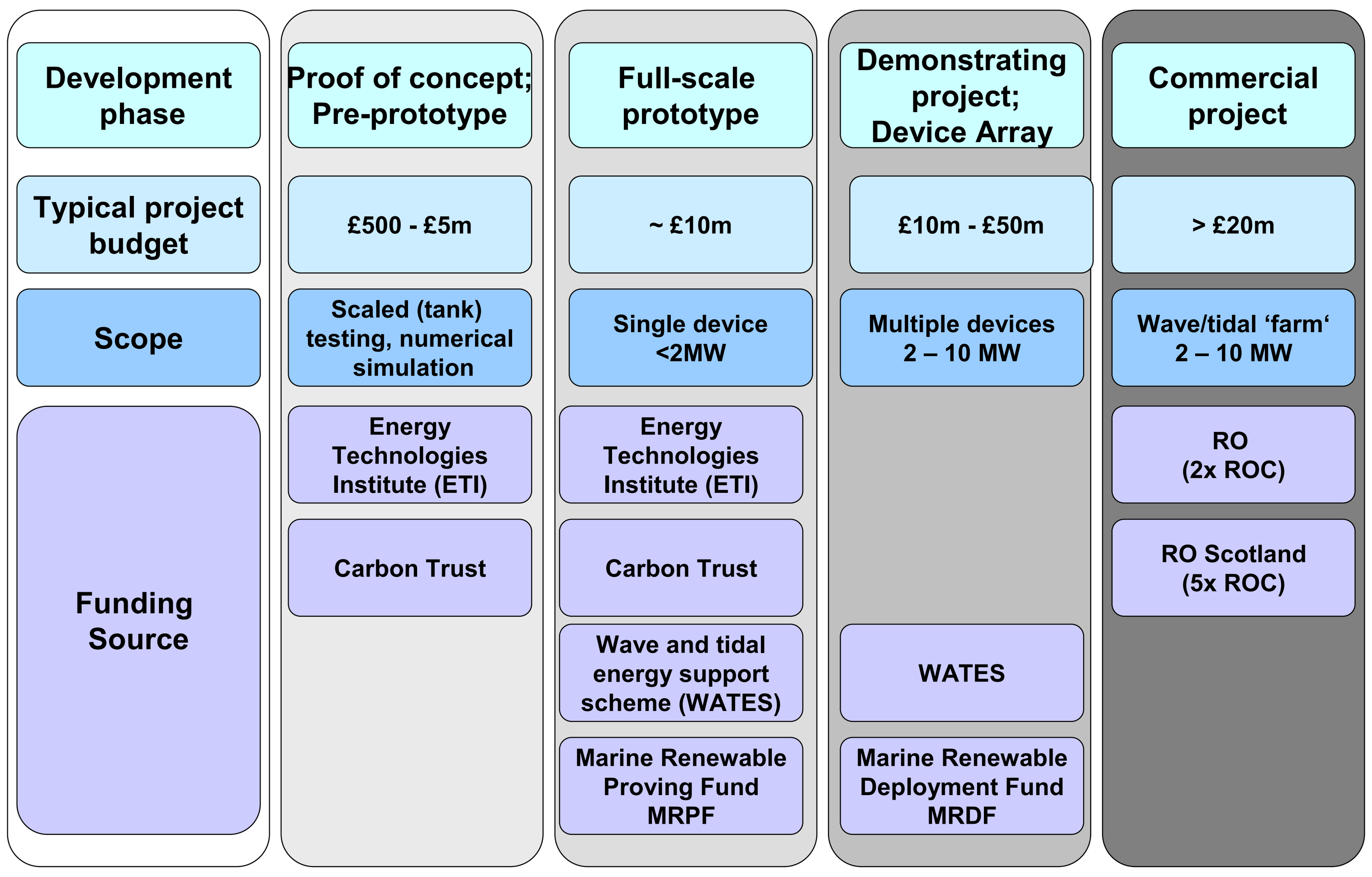


Fig.1: Marine energy funding sources at different stages of development [2]

Bathtub curve & Marine energy project risks

The Reliability Bathtub curve is a basic model of reliability behavior during the lifetime of a complex system or component. The lowest operating cost can be achieved once the design weaknesses are identified and failure only occurs due to random events (Region 2). From a reliability perspective there are three type of risks to marine energy projects:

- Early failures (e.g. Open Hydro [3], Pelamis [4], Trident [5].)
- Higher failure rates than expected
- Wear-out regime prior to project-life

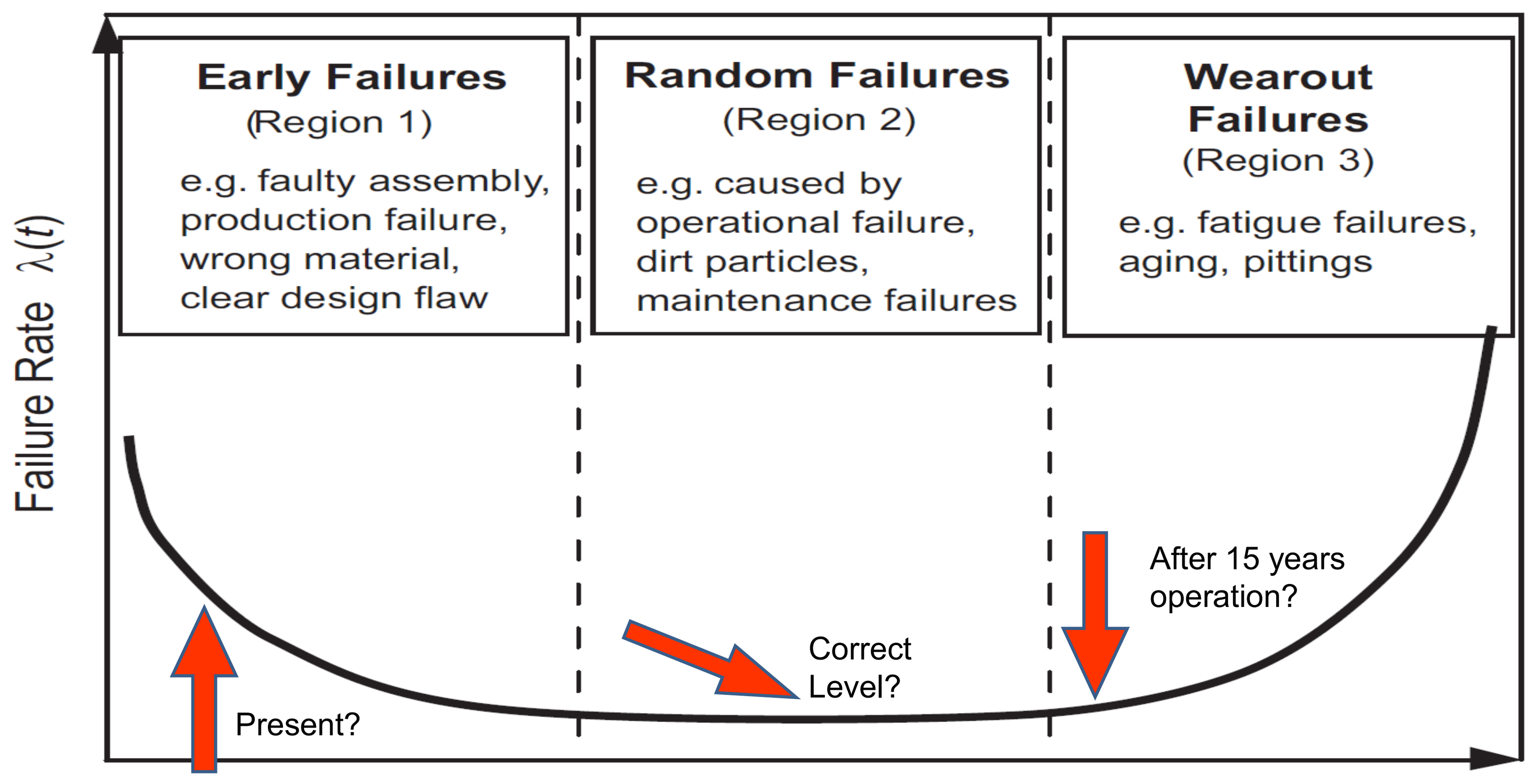


Fig. 2: Qualitative reliability bathtub curve [6]

These risks pose considerable uncertainty to project viability and may prevent/defer investment in marine renewable deployment projects.

Offshore wind installation in Germany

Until 2010 numerous wind parks have not been realised, although consent was granted. The two main reasons for this were [7]:

- Difficult grid connection
- High project risks, i.e. distance from shore (>20 km) water depths (>20m).

In 2008 the tariff for offshore wind was increased by 59€/MWh to a total of 150€/MWh, accounting for increased projects risk and cost of the first installations. As a result the first windparks are coming online this year.

Year	2004	2010
Initial Feed-in tariff* *granted 12 years, extended depending on offshore distance and water depth	91 €/MWh	150 €/MWh
Base tariff* *payment for the remaining period (initial + base toatalling 20 years payment)	61.9 €/MWh	35 €/MWh
Annual degression for new installed farms	2%* *starting 2008	5%* * starting from 2015
Planning consented	910 MW	23,634 MW
Installed	0 MW	69.5MW

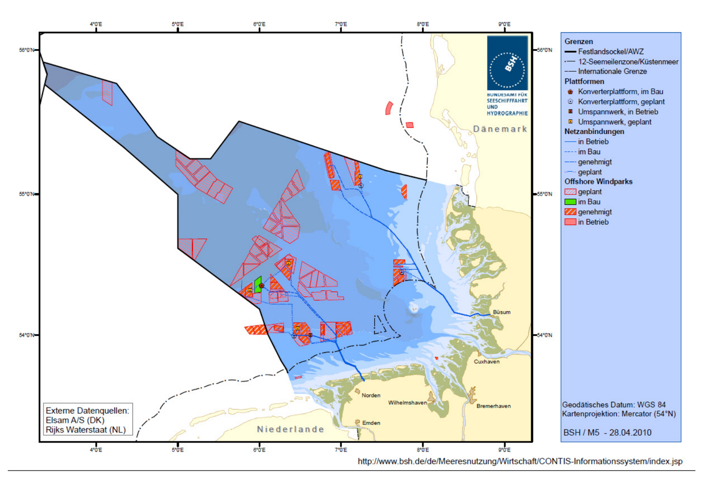


Fig. 3: Offshore wind - Feed-in tariffs and installation in Germany [8, 9, 10]

Situation for wave and tidal

For wave and tidal grid connection and high project risks (in particular installation, survivability and reliability) pose the main barriers to commercial deployment [11]. Government funded projects like the WaveHub eliminate the grid connection as a developer's risk but the inherit project risk is still high. Funding initiatives like the MRPF and MRDF aim to mitigate these project risks.

However, only if the revenue stream covers the high risk of initial commercial deployments the projects will be realised. The achievable revenue in England is approx. £250/MWh [~ £400/MWh with 5 ROC in Scotland] (assuming (£100/MWh MRDF revenue support; ~£50/MWh per ROC; ~£50/MWh market price).

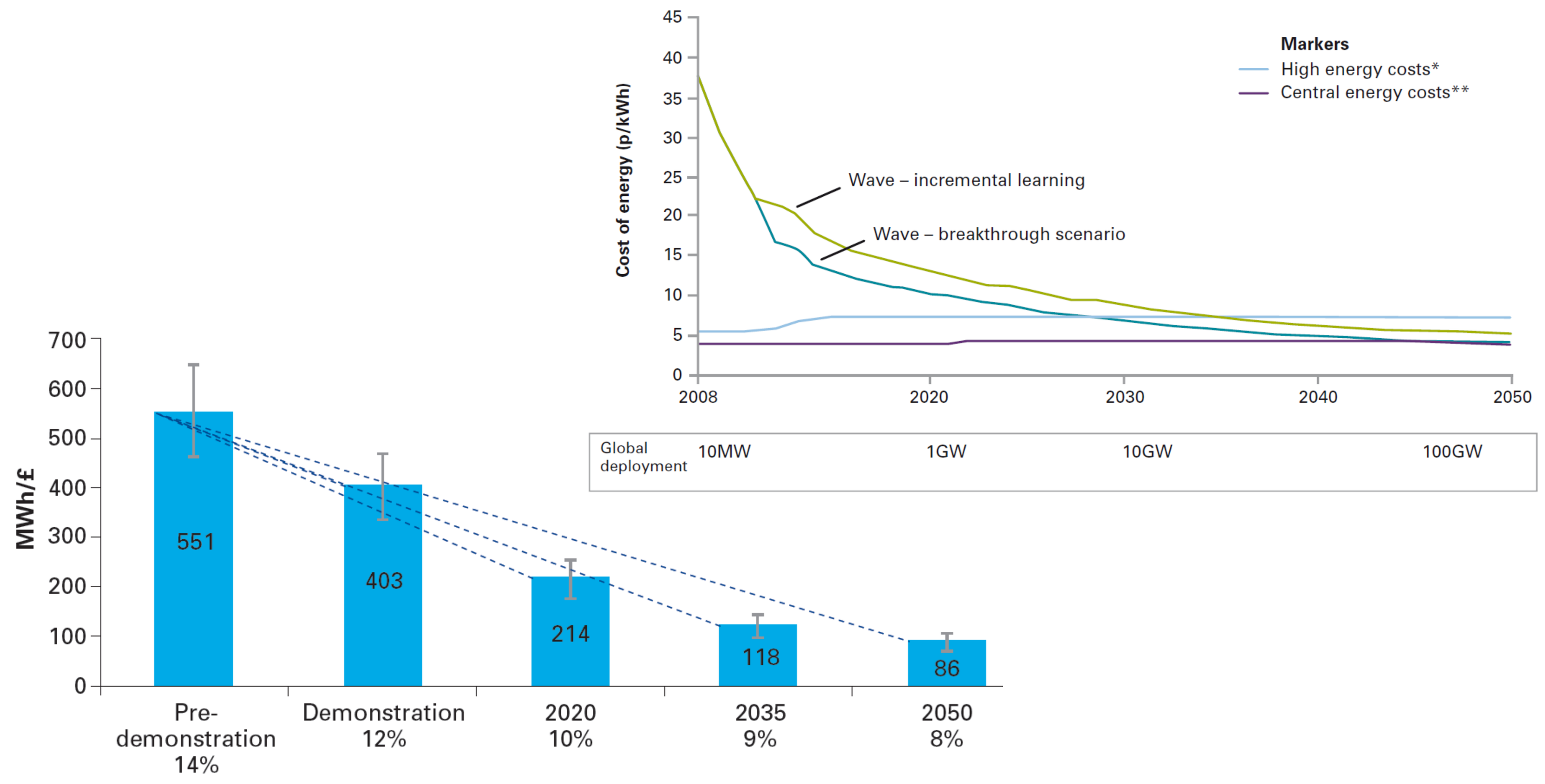
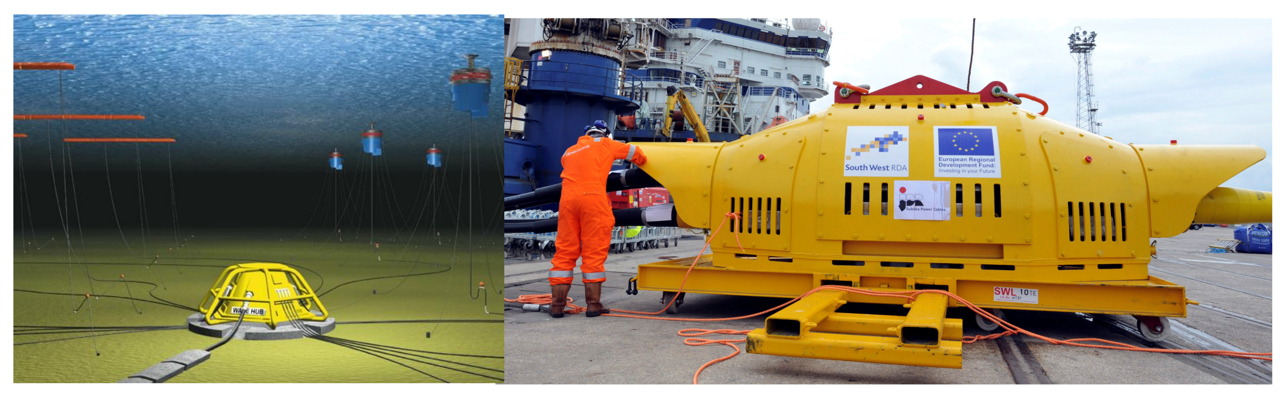


Figure 4: Projected learning curves for wave energy generation [12,13]

Options for risk mitigation

The learning curve of other technologies expects cost reductions and reliability improvements through operational experience, larger production volumes and increased installed capacity (see Fig. 4). This can only be achieved for marine energy if the high initial risks are mitigated. Possibilities to facilitate the deployment/maintenance of devices include:

- Provision of installation vessels
- Risk coverage for weather delays / installation issues
- Funding of maintenance / retrieval activities
- Higher economic incentives with secured revenue streams for operational devices (e.g. high initial Feed-In Tariffs >£400/MWh for 20 years).
- Publicly funded operation & maintenance of first marine energy farms (Spearhead programmes).
- Dedicated component/system testing to reduce failure rate uncertainties.



Pictures: SWRDA

Fig. 5: Wavehub artist impression (left) and prior to deployment (June 2010)

Conclusion

Marine renewable projects face considerable uncertainty and risk that needs to be addressed and overcome to foster initial installations and realise cost reduction potentials.

The example from the offshore wind sector shows that higher project risks can be outweighed by increased economic incentives. High subsidies for initial deployments and/or concerted governmental support in project development and installation could mitigate the high risks of initial projects and attract additional investment.

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