Research approach for efficient offshore wind farm decommissioning strategies

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Background
At the end of their operational life offshore wind farms need to be decommissioned. Up to today only three offshore wind farms were dismantled worldwide. These wind farms were rather small and located near shore in shallow water. Hence, those experiences are not directly transferable on upcoming offshore wind farm decommissioning.

As each offshore wind farm is unique, project specific decommissioning plans are required. The research project SeeOff - Strategie-entwicklung zum effizienten Rückbau von Offshore Windparks (Development of strategies for efficient decommissioning of offshore wind farms) aims to support stakeholders at developing and assessing efficient offshore wind farm decommissioning strategies.

Definition of objectives
Multiple and possibly conflicting objectives are pursued when decommissioning offshore wind farms (e.g. low decommissioning costs, conservation of hard-substrate habitats, high safety at work).

→ Economic, ecologic and social objectives are defined and structured.

Compilation of requirements
Many requirements on offshore wind farm decommissioning are associated with uncertainties (e.g. regulations on complete or partial decommissioning).

→ Legal, technical, organisational, financial, environmental and social requirements are identified and compiled in a requirement catalogue.

Process analysis
Offshore wind farm decommissioning processes are not sufficiently elaborated, documented and modelled.

→ Techniques and procedures of dismantling, logistics and recycling as well as their interdependencies are investigated. Decommissioning process alternatives are modelled and parameterized.

Impact Assessment
There are no indicators available to specifically assess offshore wind farm decommissioning processes. Assessment indicators to examine the achievement of predefined objects are in need.

→ Indicators are defined to assess
  - Economic impacts (e.g. dismantling, logistics and recycling costs)
  - Ecologic impacts (e.g. on marine environment, hazardous wastes)
  - Social impacts (e.g. safety at work, social acceptance) of decommissioning alternatives.

Strategy analysis
Multi criteria decision analysis enables investigations of decision problems with multiple, conflicting objectives.

→ Process alternatives are combined to feasible decommissioning scenarios. Weights are assigned to each assessment indicator indicating its importance relative to other indicators. Decommissioning scenarios are analysed and assessed with weighted indicators in order to identify efficient decommissioning strategies.

Results
Handbook for offshore wind farm decommissioning including

→ Structured procedure to develop and assess efficient decommissioning strategies
→ Potentials for improvement

Assessment indicators
Economic, Ecologic, Social

Efficient decommissioning strategies
→ Comply with legal requirements
→ Are cost-efficient
→ Ensure safety at work
→ Protect environment
→ Are publicly accepted