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# 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 - Strategieentwicklung 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.

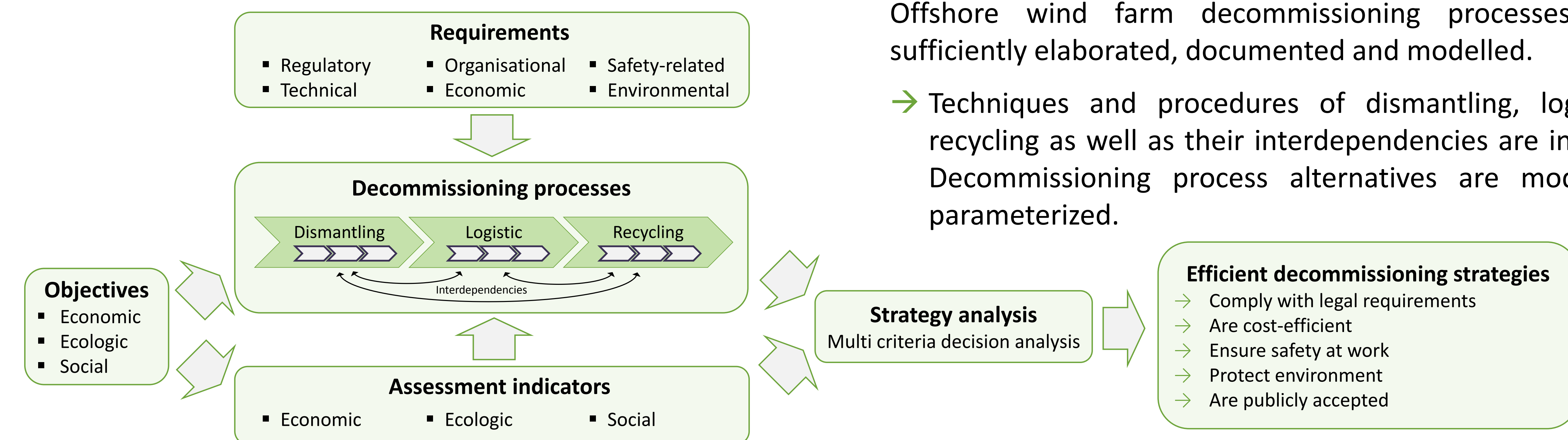


Figure 1: Research approach for developing and assessing efficient offshore wind farm decommissioning strategies

## 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.

## Potentials for improvement

Results and findings will benefit the entire life cycle of offshore wind farms.

→ Potentials for improvement of decommissioning processes (dismantling, logistics and recycling) as well as prior project phases (construction, installation, operational phases) are identified.

## Results

Handbook for offshore wind farm decommissioning including

- Requirement catalogue
- Dismantling, logistic and recycling techniques and procedures
- Economic, ecologic and social assessment indicators
- Structured procedure to develop and assess efficient decommissioning strategies
- Potentials for improvement

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