LIFE CYCLE COST ASSESMENT OF FAST RESPONSE ENERGY STORAGE (FRESS) TECHNOLOGIES FOR SHIPS

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Introduction

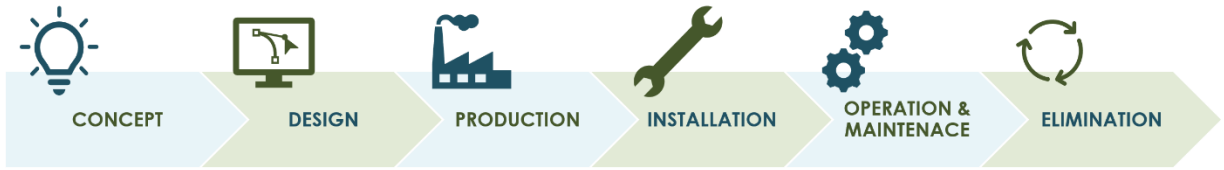
POSEIDON project

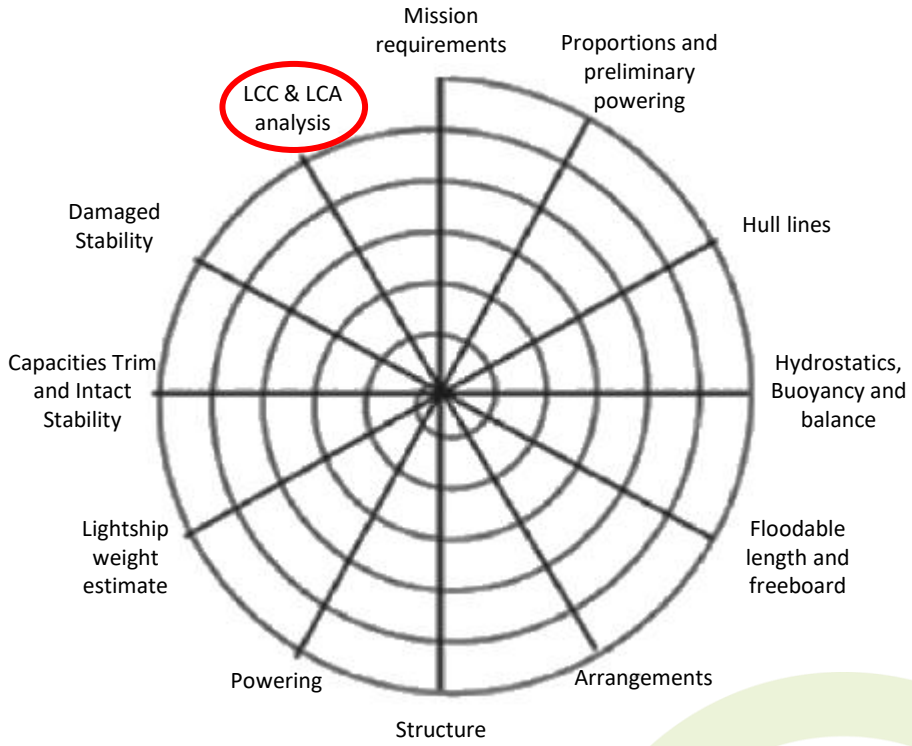
- **Challenge** → Cut the CO2 emmmissions in half by 2050
- **Objective** →Demostrate the applicability of 3 ESS in waterborne transport
- **Issue** → Good response against high demand energy peaks
- **Collaborators** → Cyclomed, CERN, ANTEC, OCEM CIEMAT, TPH, CTN, UPM, DAMEN, EFESTO
- **Funding** → Project founded by Horizon Europe with 5M €
- **Results** →
  - **SMES:** TRL 4
  - **KESS & EESS:** TRL 5-6

Scope– LCC/LCA
Economical analysis of the adequacy of the three storage systems manufactured for the POSEIDON project so they work as the power sources for a vessel (Cap de Barbaria)

LCC analysis definition

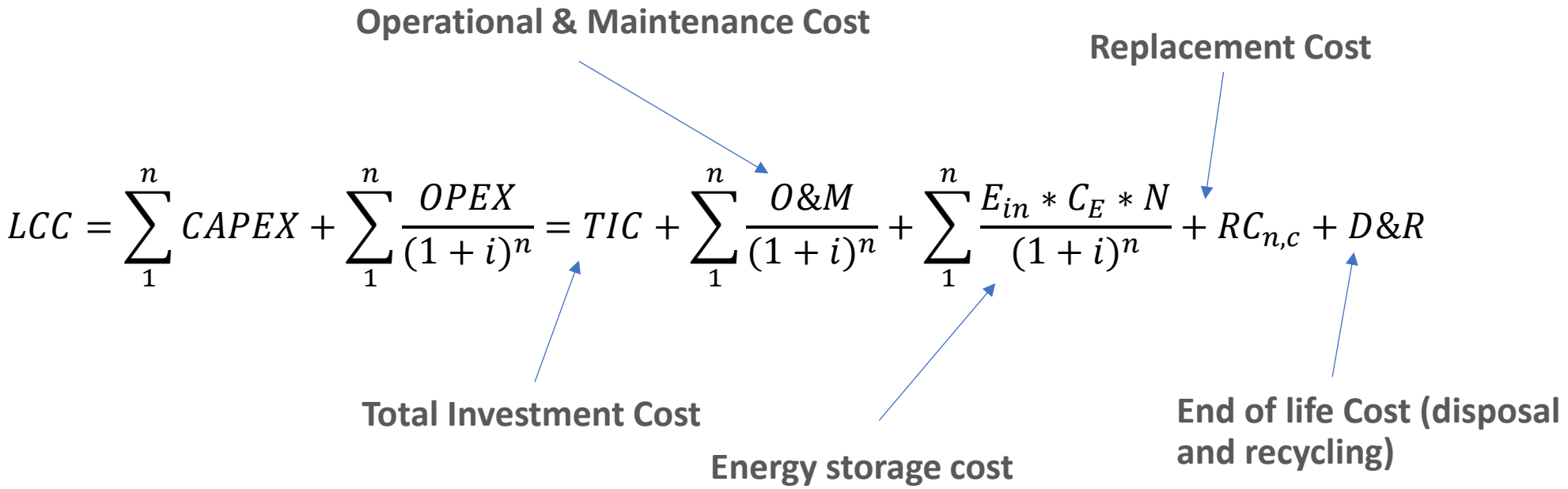
- **What is an LCC?→** Economical analysis of the cost of a product during its entire lifecycle.
- **Reason to do the LCC →** Optimize cost
- **Necessary data →** Budget, economical factors, lifecycle of the product,…
- **Results→** Study that allows improving for more profitable solutions





Methodology for a LCC analysis

Expenses categories for POSEIDON



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Example

Use cases for the LCC

Scenario 1: All technologies apart

- Individual LCC of the KESS and its auxiliary systems
- Individual LCC of the EESS and its auxiliary systems
- Individual LCC of the SMES and its auxiliary systems
- Compare the different FRESSs LCC to select the one more suitable

Scenario 2: Project analysis

- Study of the cost that it Will take to our system to be functioning during the stablished time
- Considerate the neccesary cost for the electrical equipment & installation to ensure its functioning at Cap de Barbaria

LCC analysis on POSEIDON project

Limitations
• Lack of information about the disposal cost • The energy data is estimated based on simulations • Manufacturing of the three storage technologies ongoing to the date • Electronics and electric equipment still on designing phase • Not knowledge about pollutant emission fare • Estimation of economical factors such as inflation and investment interest to calculate the discount rate

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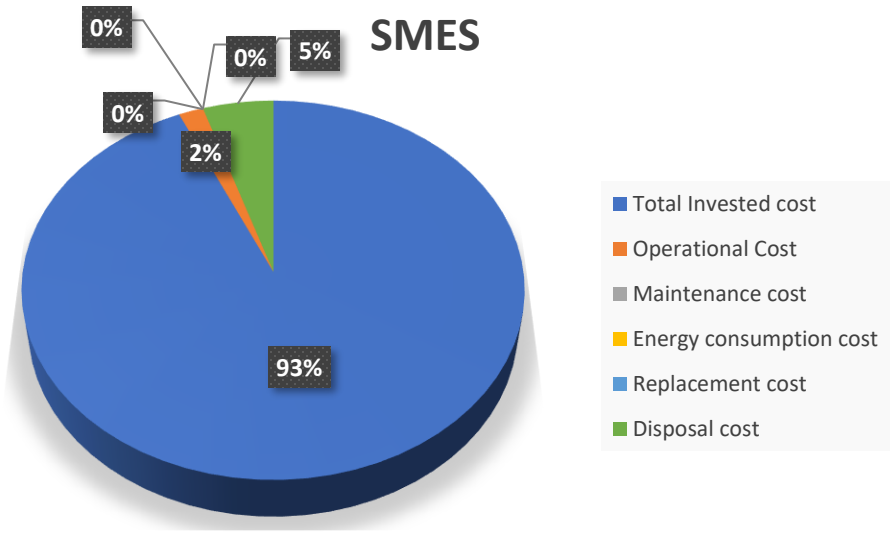
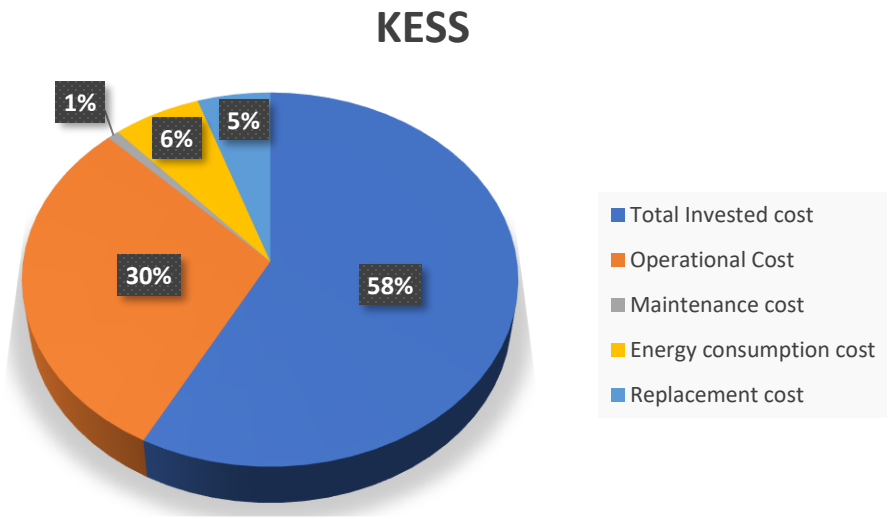
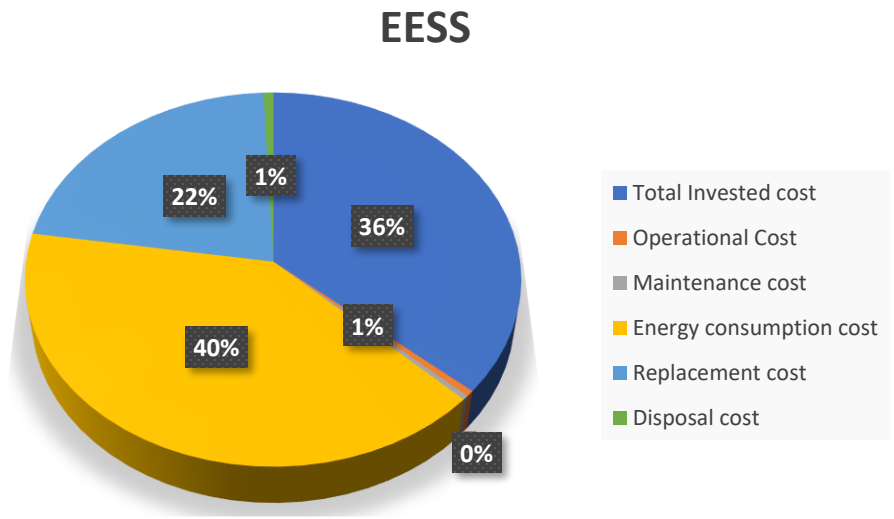
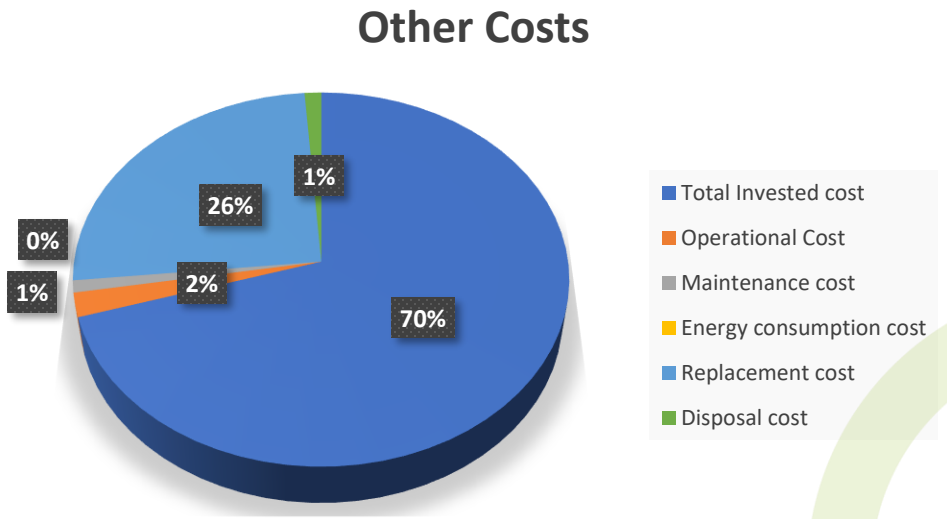
LCC
RESULTS

Use Case 1: Results per technology

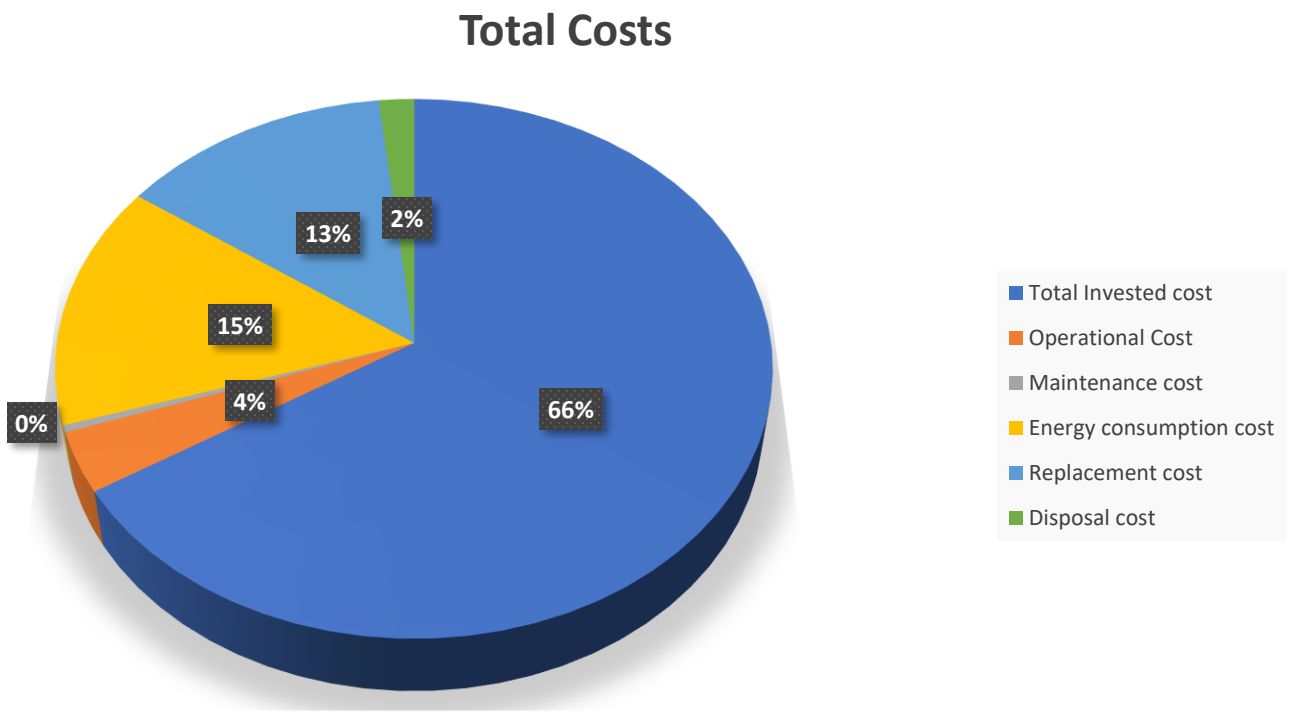








Use Case 2: Total Poseidon Costs



Conclusions

- The LCC is a useful tool that allow us to easily compare the total cost of a product during its lifecycle.
- It can be combined with the environmental LCA analysis
- Depending on the source of the energy the amount of money spent on fuel/electricity should be accounted
- Apart from the usual parameters taken into consideration for a budget, there are some other factors that may affect to the adequacy of some products and have a big impact on the final cost.

Future work

- Testing technologies on board → Study the correlation between simulations and real environment
- Create a computing tool with operational profiles to easily calculate an LCC.
- Carry out a Life Cycle Assessment (LCA) to estimate the environmental damage/benefit we obtain with our developed technologies
- Combine the LCC and LCA analysis to considerate economical and environmental factors during the designing phase.

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Questions & Answers

Thank you for the attention!

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