FIBRE4YARDS
SHIPYARD FOR THE FUTURE

# The FIBRE4YARDS Cost-Benefit Analysis


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**Final Dissemination Event**
**13 December 2023**
**Technocampus Océan, Nantes, France**


This project has received funding from European Union's Horizon 2020 research and innovation programme under grant agreement n° 101006860

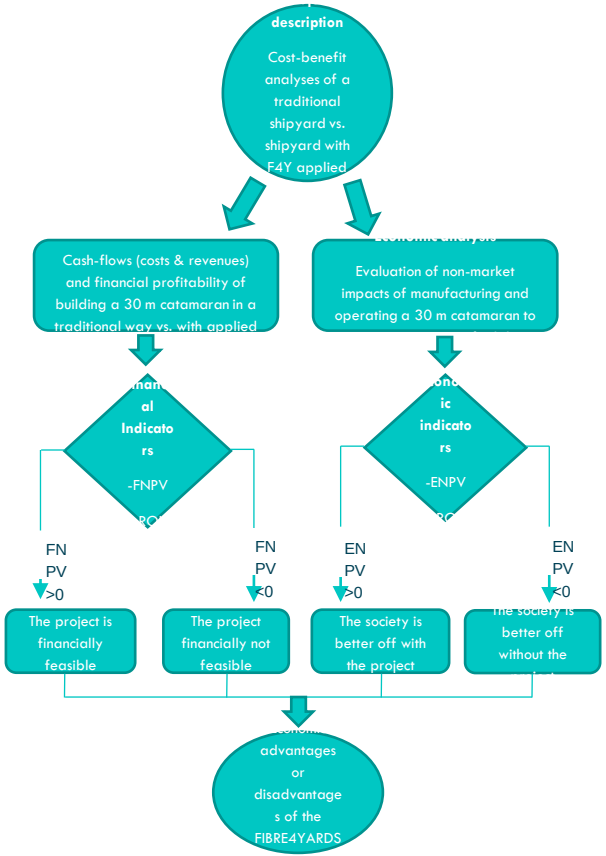
# What is Cost Benefit Analysis (CBA) and why we used it in FiBRE4YARDS?

- The main objective was to understand how the introduction of FiBRE4YARDS technologies would impact the shipyards involved and the project as a whole.
- Cost Benefit Analysis helps to determine the costs associated with the introduction of the technologies and the potential benefits, such as reducing production time or improving the quality of the ships.
- Cost Benefit Analysis also allows for the analysis of the project's periodic costs and benefits, aiding in long-term evaluation and financial decision-making.

# What was the CBA methodology in the FIBRE4YARDS project?

- The analytical framework of the CBA was based on the European Commission's *Guide to a Cost-Benefit Analysis of Investment Projects.*

- The study is structured into a financial and economic analysis to properly measure the project's financial sustainability and its contribution to social welfare



# Data collection to the CBA calculation

- A questionnaire was sent out to the consortium members in December 2022. The survey aimed to gather information about the cost of the various technologies developed and utilised during the FIBRE4YARDS project.

| Specifications | Steel Catamaran Baseline vessel | FIBRE4YARDS Catamaran Reference vessel |
|---|---|---|
| |  |  |
| Description | Passenger ferry | |
| Length (m) | 32 | |
| Beam (m) | 10 | |
| Structure material | Steel | Composite |
| Light ship displacement (t) | 100 | 68.5 |
| Service speed (knots) | 15-20 | 20-22 |
| Capacity (pax) | 200 | Up to 360 |
| Engines | 2 x Cummins KTA 19-M each 500 HP @ 1800RPM | TBA |
| Generators | 2 x Cummins Generator 30 Kva | TBA |

# Data collection to the CBA calculation

- Where the required information was not available from consortium members or completed deliverables, market insights were gathered and synthesised from various sources. These sources included, but are not limited to:
  - Scientific papers, journals, and publications
  - Industry and government websites for blogs, magazines, and other publications
  - Conference proceedings and association publications
  - Technical brochures, annual reports, press releases, product information, including technical specifications, etc.
  - Company Brochures, Industry publications,
  - Other sources not mentioned above including journals, articles, etc.

# Scenario analysis

- Historically well-established manufacturing technology to establish baseline scenario (Business as Usual, BAU). This is defined as what would happen in the absence of the project. Two options were considered. Steel vessel manufacturing (Steel BAU), and composite (FRP BAU) ferry manufacturing with no-automatization.
- 2 BAU Scenario
- 6 FIBRE4YARDS Scenario:
  - 3 for large shipyards (investing in FIBRE4YARDS technologies for in-house production)
  - 3 for small-to-medium sized shipyards (subcontracting parts manufacturing)

# Automatization levels in FIBRE4YARDS CBA scenarios

❑ **FIBRE4YARDS Automatization level 1 scenario:**

-Adaptive moulds for composite panel assemblies, curved panels (CurveWorks)

-Out of die UV cured pultrusion for curved profiles (IRURENA)

-Hot stamping of thermoplastic materials (INEGI)

# Automatization levels in FIBRE4YARDS CBA scenarios

❑ **FIBRE4YARDS Automatization level 2scenario:**

-Adaptive moulds for composite panel assemblies, curved panels (CurveWorks)

-Out of die UV cured pultrusion for curved profiles (IRURENA)

-Hot stamping of thermoplastic materials (INEGI)

-Additive Manufacturing, 3D printing, Automatic Tape Placement(10XL)

# Automatization levels in FIBRE4YARDS CBA scenarios

❑ **FIBRE4YARDS Automatization level 3 scenario:**

-Adaptive moulds for composite panel assemblies, curved panels (CurveWorks)

-Out of die UV cured pultrusion for curved profiles (IRURENA)

-Hot stamping of thermoplastic materials (INEGI)

-Additive Manufacturing, 3D printing, Automatic Tape Placement (10XL)

-Shipyard 4.0 technology elements with real-time monitoring including sensors technology, communications protocols, digital twin models, cyber-physical systems, IoT (OSI4IOT) platform (TSI)

# How large shipyards can use the results of the FIBRE4YARDS Cost Benefit Analysis?

- Large shipyards are uniquely positioned to afford investments in FIBRE4YARDS technologies due to the enormous scale of their operations. The Level 1, Level 2 and Level 3 scenarios demonstrate large shipyard operations where the shipyard invests into different level of FIBRE4YARDS automatization and utilize these cutting-edge technologies in-house to remain competitive, improve their efficiency, and contribute to a more sustainable future for the maritime industry.

# How small- and medium sized shipyards can use the results of the FIBRE4YARDS Cost Benefit Analysis?

- Small-to-medium sized shipyards in the Level 1 SUBCONTRACTED, Level 2 SUBCONTRACTED, and Level 3 SUBCONTRACTED scenarios do not invest into automation, and the majority of part production work is carried out by specialised technology service provider subcontractors. This is because small-to-medium shipyards might not have the financial resources to make substantial investments into automation technology, and they may have limited access to external capital, such as loans or investments. This contributes to substantial cost reductions.

# How small- and medium sized shipyards can use the results of the FIBRE4YARDS Cost Benefit Analysis?

- strategic cost-cutting measure, allowing shipyards to minimize these overhead expenses while redirecting their resources towards their core shipbuilding competencies, such as vessel assembly and rigorous quality control.
- subcontracting extends its benefits to offering much-needed flexibility in responding to fluctuating production demands
- subcontractors, who frequently engage in multiple projects for diverse clients, capitalize on economies of scale. They can procure materials in larger quantities, negotiate more favourable prices, and optimize their production processes. These operational efficiencies translate into faster and more cost-effective part production, ultimately contributing to cost savings for the shipyards.

# Comparison of FIBRE4YARDS Automatization Level CBA Scenarios

| FIBRE4YARDS AUTOMATIZATION LEVEL | MANUFACTURING COSTS (Reference baseline: Steel BAU) | Number of ships manufactured per year | FNPV | FNPV Ranking No. (lowest value is the best) |
|---|---|---|---|---|
| STEEL BAU | 100 units | 5 | 177,638 | 5 |
| FRP BAU | 189 units | 3 | 204,562 | 4 |
| LEVEL 1 AUTOMATIZATION | 142 units | 5 | 8,853 | 7 |
| LEVEL 1 AUTOMATIZATION SUBCONTRACTED | 109 units | 6 | 240,765 | 3 |
| LEVEL 2 AUTOMATIZATION | 136 units | 6 | -6,923 | 8 |
| LEVEL 2 AUTOMATIZATION SUBCONTRACTED | 106 units | 7 | 274,850 | 2 |
| LEVEL 3 AUTOMATIZATION | 133 units | 6 | 146,278 | 6 |
| LEVEL 3 AUTOMATIZATION SUBCONTRACTED | 108 units | 7 | 278,385 | 1 |

The table provides financial comparison of the different scenarios related to shipbuilding, with a focus on estimated selling prices, shipbuilding costs, and financial returns. The rankings are based on the Financial Net Present Value (FNPV), where scenarios with higher FNPV values are considered more financially favorable. " LEVEL 3 AUTOMATIZATION SUBCONTRACTED" is the most financially attractive scenario from a small-to-medium shipyards point of view.

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# Thank you !

https://www.fibre4yards.eu/

https://www.linkedin.com/company/fibre4yards/





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