



World Sailing

MARINESHIFT360

AN INTRODUCTION TO LIFECYCLE ASSESSMENT

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 **Anthesis**





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WHAT IS LIFECYCLE ASSESSMENT?



What is Lifecycle Assessment?

(Definition)

A method for quantifying the environmental impact of a product, service or system across the whole lifecycle

WHAT IS MARINESHIFT360?

A streamlined Lifecycle Assessment tool designed specifically for the marine industry, developed in partnership with 11th Hour Racing and Anthesis Consulting Group

VISION

A marine industry that fully understands the environmental footprint of its products, and is empowered to make a measurable shift from a linear to a circular economy.



MISSION

1. Make Lifecycle Assessment Tools accessible to all.
2. Develop an industry specific, ultra reliable database of materials and processes
3. Provide a platform that drives collaboration and green innovation

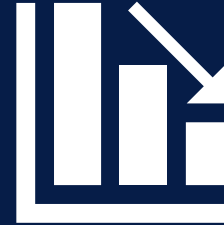
HOW DOES IT WORK?



Material & Process
Selection



MARINESHIFT360
Calculation



Impact Dashboard



Simulate reduction
opportunities

Use **pre-defined assessment templates** to enter your unique data;

- Raw materials
- Production process
- Up and Downstream transport
- Use Phase inputs
- EOL processing

MS360 will calculate the environmental impact across **7 impact categories** using our uniquely tailored database.

- GWP (Fossil & Non Fossil)
- Energy Consumption (Renewable & Non Renewable)
- Mineral Resource Scarcity
- Water Consumption
- Marine Eutrophication
- *Waste Factor*

The impact data is presented in a **configurable dashboard** so you can truly understand where your **'Hotspot'** areas lie

Once you understand where your high impact areas appear, you can simulate the variables within your product system to **find lower impact solutions**



HOW DOES LCA CREATE VALUE FOR THE MARINE INDUSRTY?

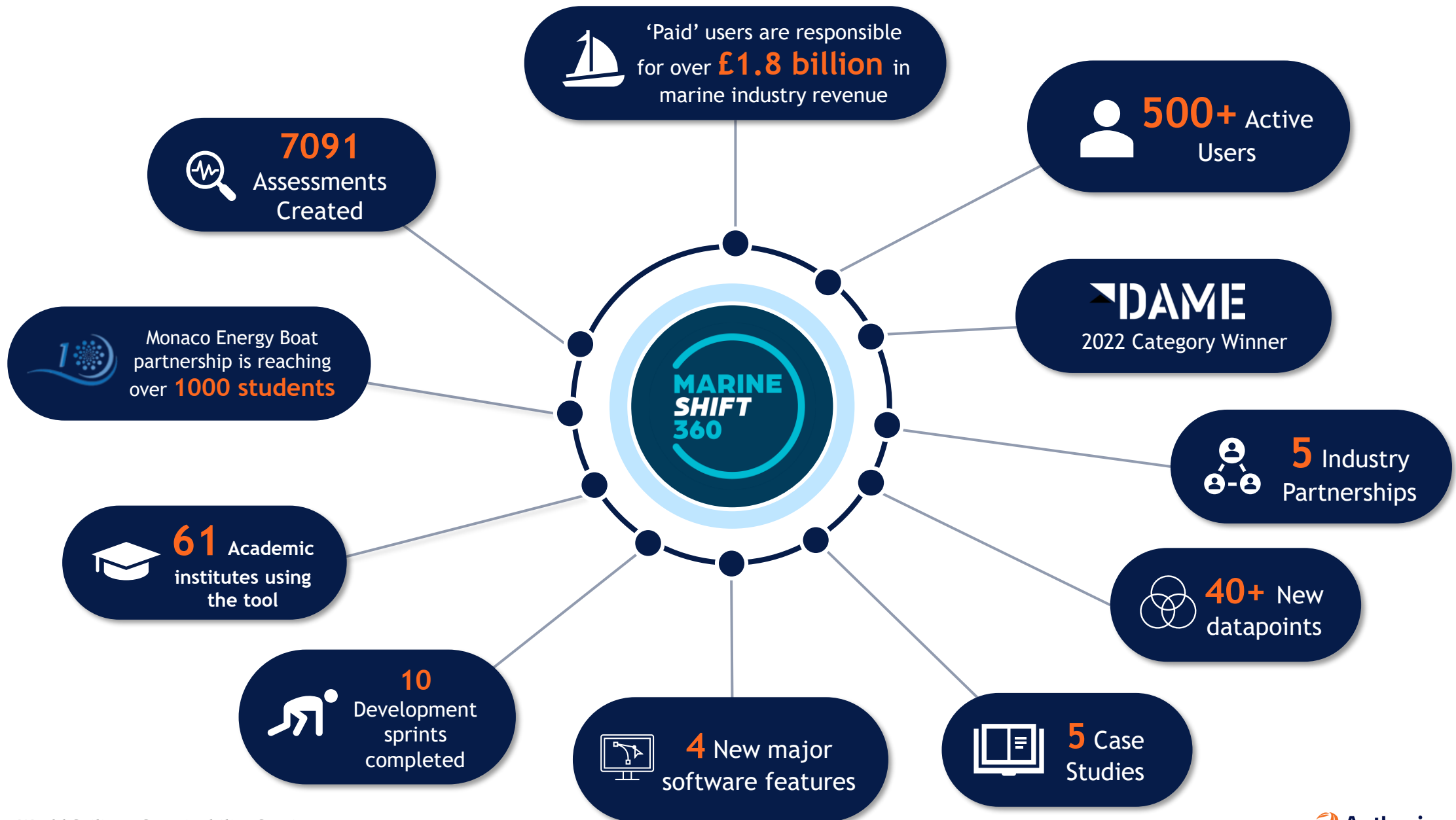
CLIENTS

“

Environmental sustainability is at the heart of the modern age of maritime engineering and having access to MarineShift360 as the world's first dedicated LCA software for marine craft has been invaluable for our students, keeping their education at the cutting edge.



Dr James Blake
Director of Programmes for
Maritime Engineering



03

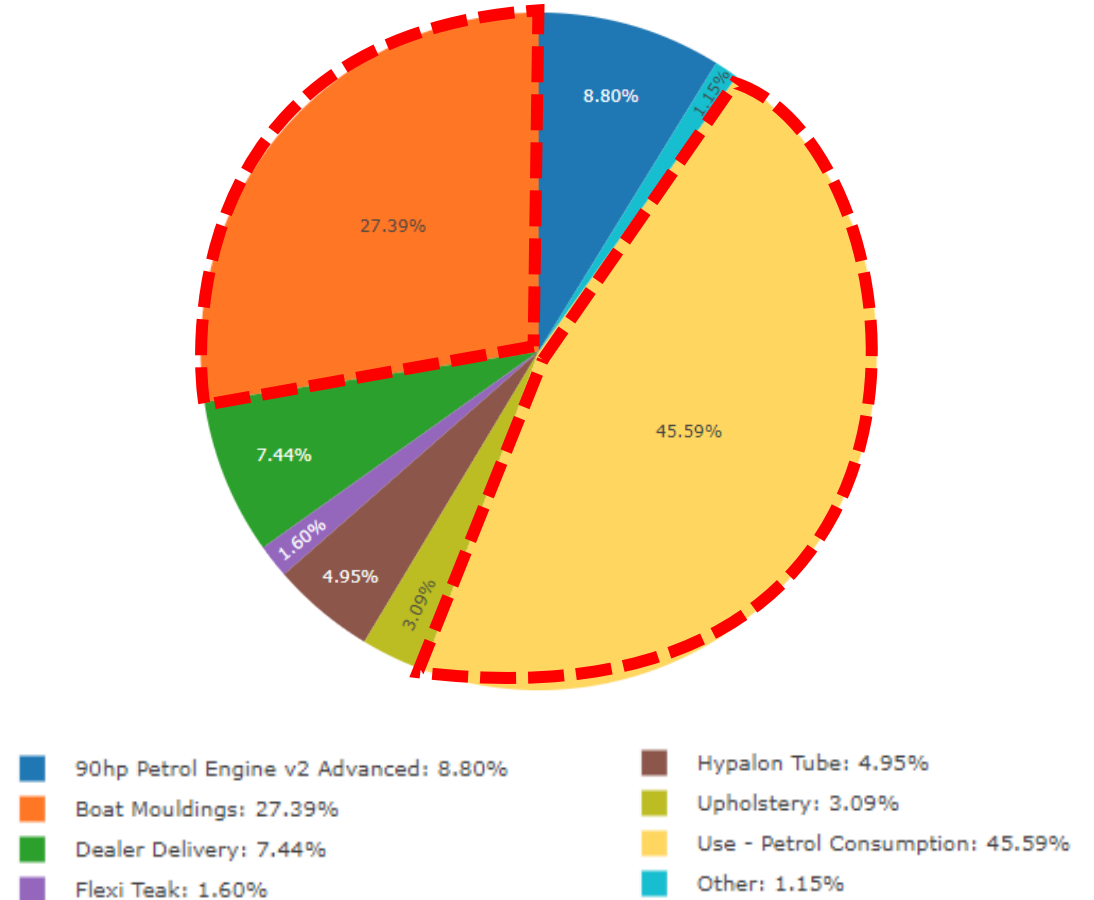
PRODUCT OPTIMISATION



OPTIMISATION PROCESS

1. Measure and understand your baseline
2. Identify the high impact areas
3. Simulate the variables within each component assembly to find the 'Lowest' impact solution

4m Boat: Co2e Breakdown



MS360 STREAMLINED ‘PROCESSES’

COMPOSITE MANUFACTURING EXAMPLE

1x Set of resin infused
GRP mouldings for a 4m
boat

*(Hull, Deck, Helm,
engine tray)*

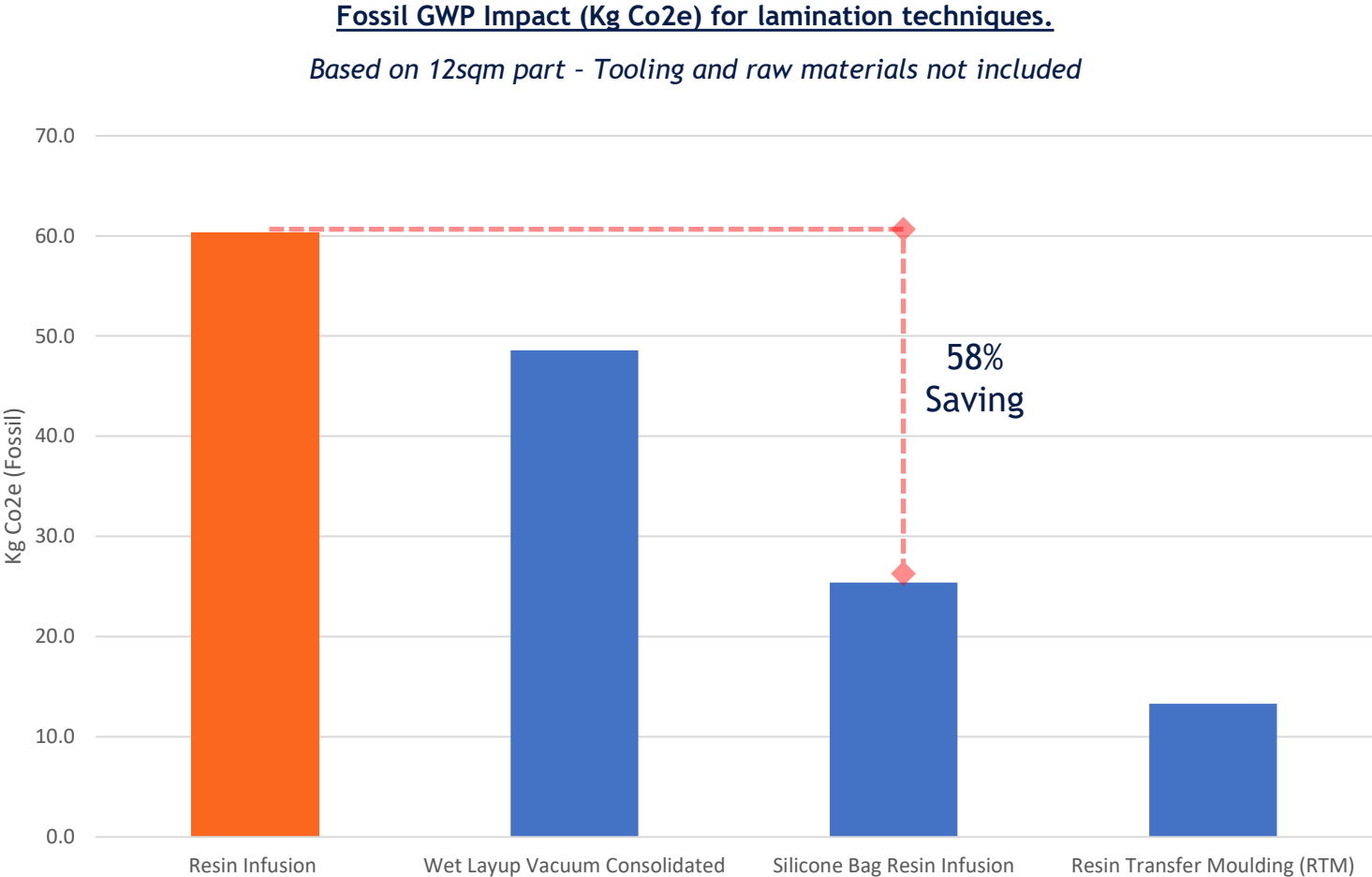


Material/Process Type		Mass/Surface Area		Fossil GWP Kg Co2e		% of Total Fossil GWP
Raw Materials	Dry Fibers - Fibreglass	66	Kg	161	Kg Co2e	22%
	Polyester Resin	50	Kg	280	Kg Co2e	38%
	Gelcoat White (Polyester)	38	Kg	213	Kg Co2e	29%
	PVC Foam Core	4.5	Kg	16	Kg Co2e	2%
	Timber Plywood Core	10	Kg	7	Kg Co2e	1%
Process	Resin Infused Lamination	12	sqm	60	Kg Co2e	8%

MS360 STREAMLINED ‘PROCESSES’

COMPARING PROCESS REDUCTION OPPORTUNITY

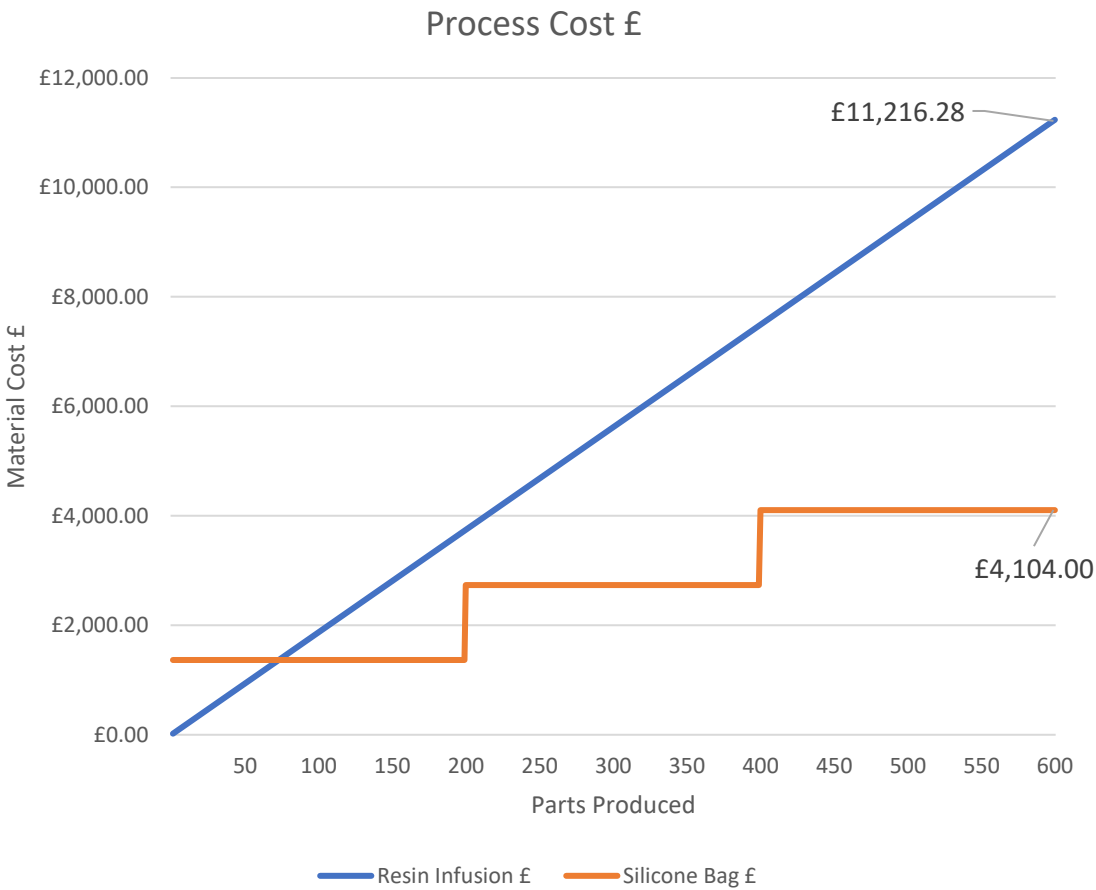
Significant Co2e savings available by utilising alternative lamination techniques



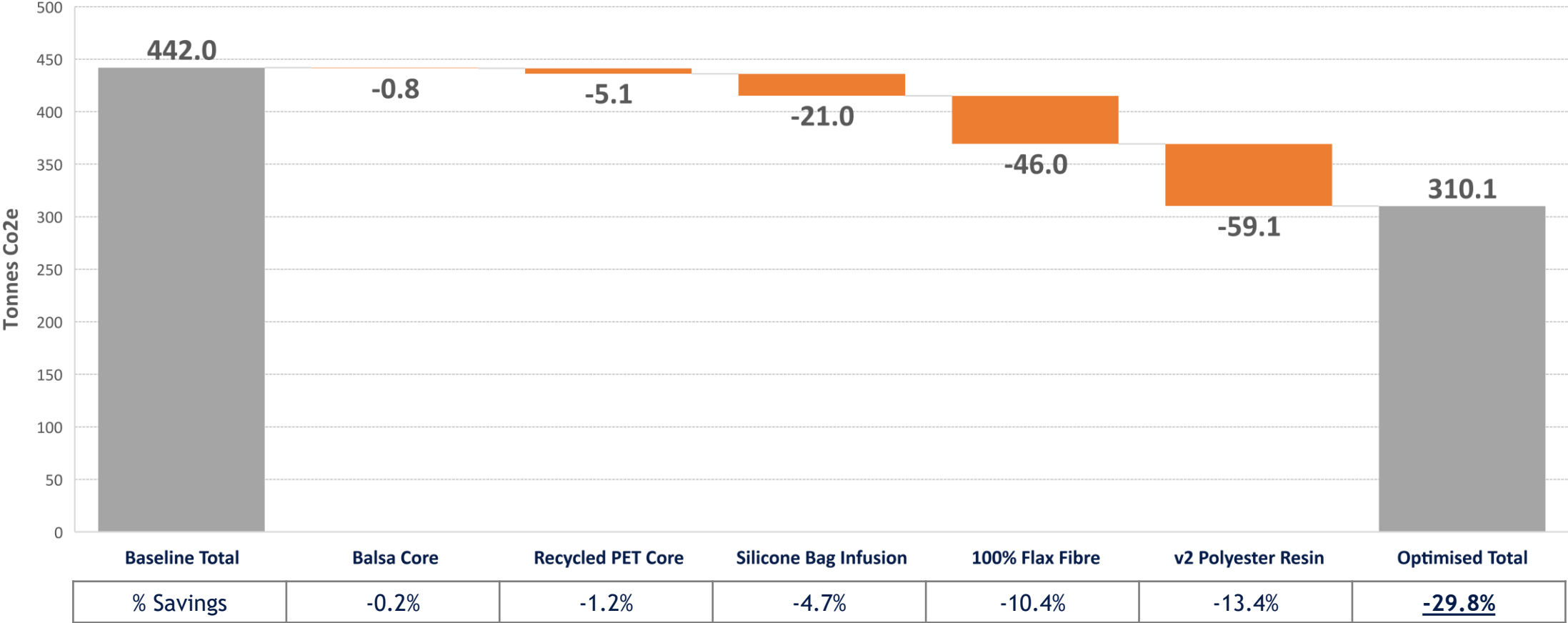
*Based on silicone bag lasting 100x pulls before replacement

COST VS. CARBON SAVING?

Over 600x part production run, 21 Tonnes Co2e avoided and £7131.00 saved



OPTIMISED PART POTENTIAL?



04 CASE STUDIES

STARBOARD

GOAL

Starboard wanted to assess the environmental impact of their entire product portfolio for 3 key reasons;

1. Calculate their total product based carbon emissions to drive their 10x climate positive offset programme
2. Use the LCA data to simulate a variety of reduction opportunities
3. Produce their annual carbon footprint report and plastic footprint report

They are also using the tool to deliver against their 2030 reduction goals as stated below

“ We aim to reduce our Scope 3 emissions per tonne of product produced, to 5.7 tonnes Co2e by 2030 – A 42% decrease based on our 2020 baseline intensity

2022 Starboard Carbon Footprint Report



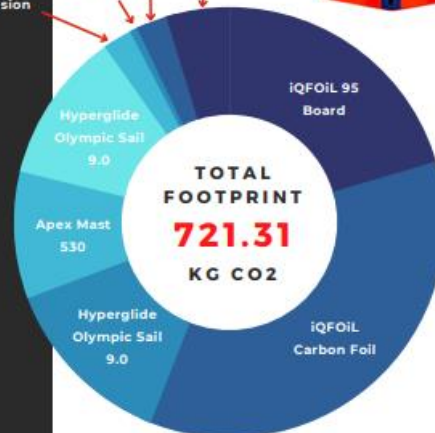
STARBOARD
INNOVATION QUALITY



MARINESHIFT360



AVERAGE FOOTPRINT GEN R Blue Carbon 2024	
CO ₂ EMISSIONS	
	kg of CO ₂ e
Raw Materials	86.09
EPS Foam	19.53
PU Foam	0.54
Wood	0.01
Glass Fiber	9.29
Carbon Fiber	28.01
PVC	0.16
EVA	1
Recycled Nylon	2.52
Bio Resin	24.18
Paint	0.86
Upstream Transport	0.71
Factory Waste	6.81
Packaging	4.07
Electricity (10% Solar)	58.30
Downstream Transport	2.48
Emissions per board	158.46 kg CO ₂ e

SDM
Extension

TOTAL FOOTPRINT
105.2
KG CO2

Category	Value (kg CO2)	Percentage
Raw Materials	50.5	50.5%
Waste	1.9	1.9%
Other	52.8	50.0%

CASE STUDY

WILLIAMS JET TENDERS

GOAL

Williams Jet Tenders wanted to quantify their environmental impact and investigate how they could reduce these impacts over time by simulating alternative materials and production processes.

OUTCOMES

Sustainability embedded as central pillar of strategic direction and LCA integrated as a 'Gateway' stage in all new product development.

- LCA Case Study published at METS 2021 and Carbon Offset and reduction programme announced
- MS360 used to model composite and drivetrain options – **Unexpected results!**
- MS360 used to re-focus supply chain and procurement direction towards more local sources



CASE STUDY – WILLIAMS JET TENDERS – TURBOJET 325

- 51% of the lifetime impact comes from the 'USE' phase, petrol being burnt in the 90hp engine
- 48% of the lifetime impact is seen in the production phase e.g. impacts derived from the materials and processes used to create the tender - 56% of this impact was created by the fibreglass mouldings and aluminium jet pump
- Multiple scenario analysis were carried out to simulate reduction pathways in all 'Hotspot' areas, these included;
 - Alternative Propulsion systems
 - Natural fibre composites (Hemp, Flax, Basalt)
 - 50-100% recycled content in all metal parts



GLOBAL WARMING

9,120 Kg CO₂E

Roughly equivalent to 1x UK based persons annual GHG output



ENERGY CONSUMPTION

201,280 MJ

Equivalent to 17 UK homes energy use for one year



WATER CONSUMPTION

74 m³

Equivalent to 1.5 persons annual water usage in the UK

PARTNERSHIPS

“Coming together is a beginning. Keeping together is progress. Working together is success.”

Henry Ford

We are working in partnership with the leading governing bodies, to establish the framework for LCA adoption and usage within the marine industry.



MarineShift360 is an official sustainability partner to the IMOCA class

The IMOCA class are running LCA's on all new boats (*14 studies*), with the view to making LCA and carbon caps compulsory as part of the class rules in 2024.



The Monaco Energy Boat Challenge are utilising MarineShift360 to enable all competitors (1000+ students) to measure, manage and reduce the emissions of the novel vessels being developed to take part in the challenge.

The competition operates at the leading edge of solar, hydrogen and alternative fuel vessels.

Q&A

THANK YOU

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