



EBI webinar - Understanding Life Cycle Assessment

EBI webinar | 9 November 2021





European Boating Industry Webinar Understanding Life Cycle Assessment

9th November 2021

Craig Simmons, Anthesis Group



What is Life Cycle Assessment?

Life Cycle Assessment (LCA) is the
“compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle”

Project: Yacht

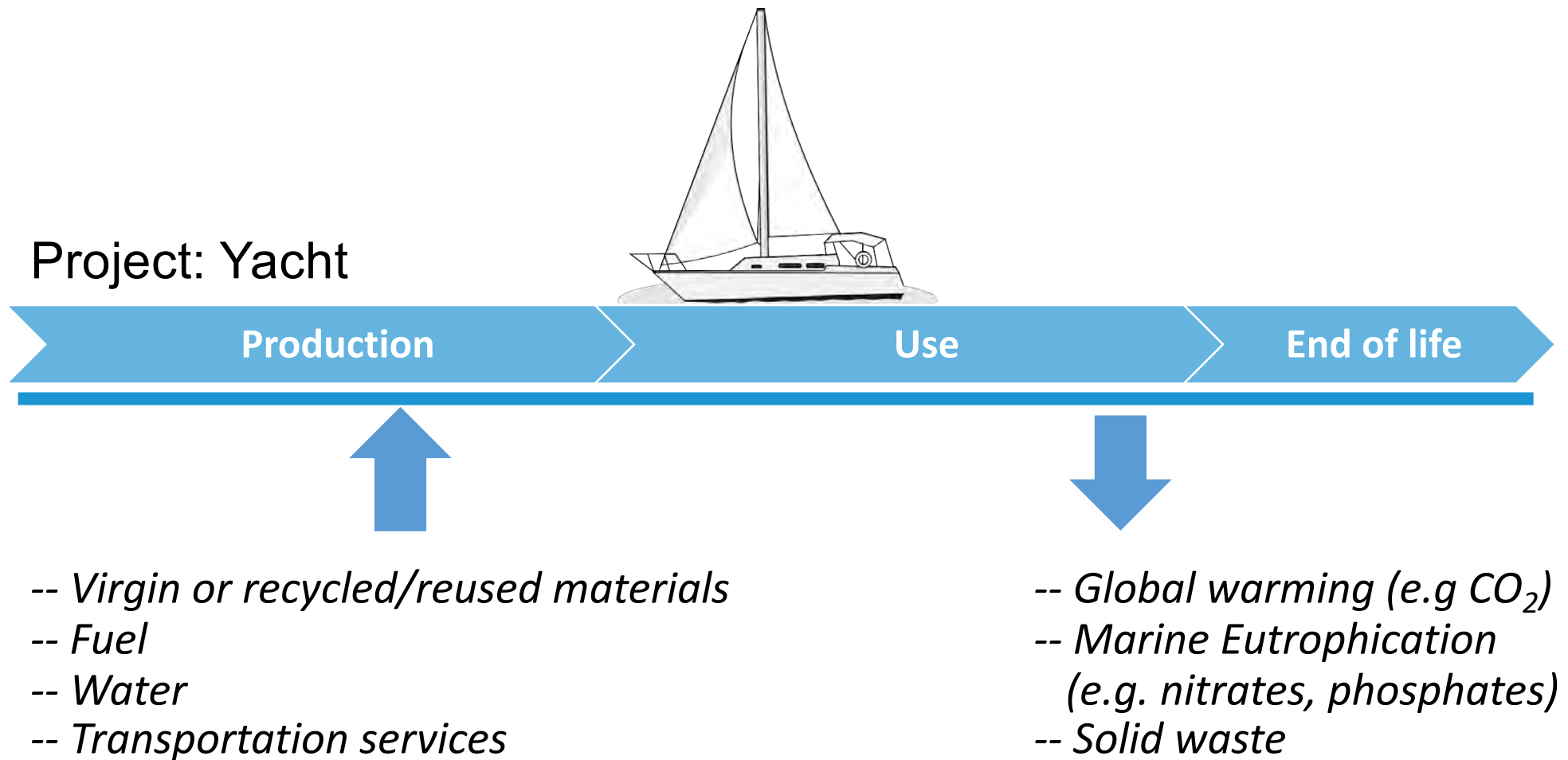


Production

Use

End of life

What is Life Cycle Assessment?



What is Life Cycle Assessment?

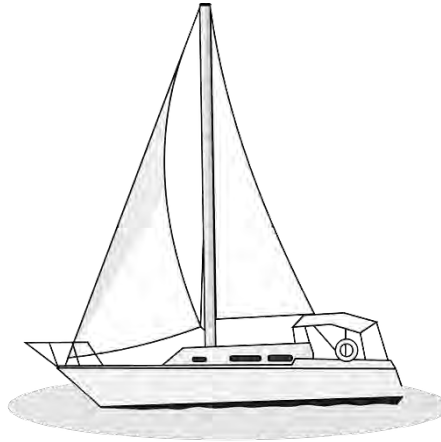
ISO 14044; 2006 is an internationally agreed LCA standard.

It provides guidance on the following:

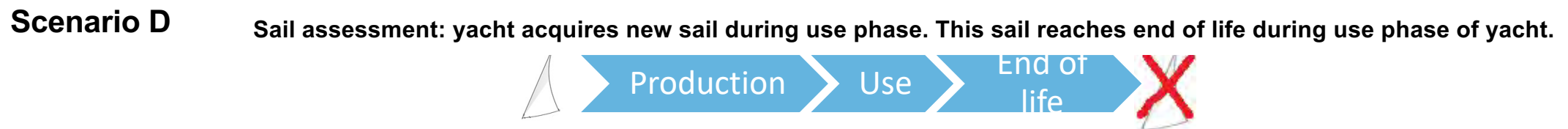
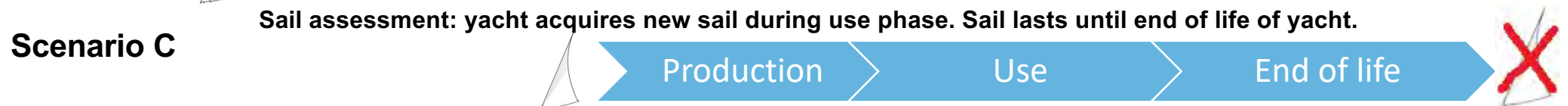
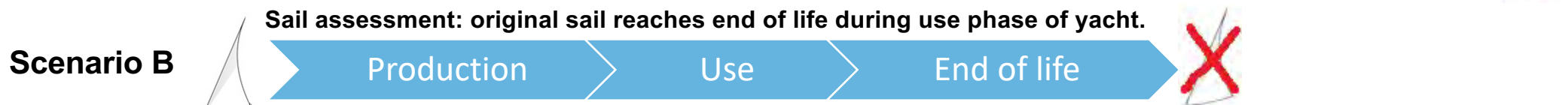
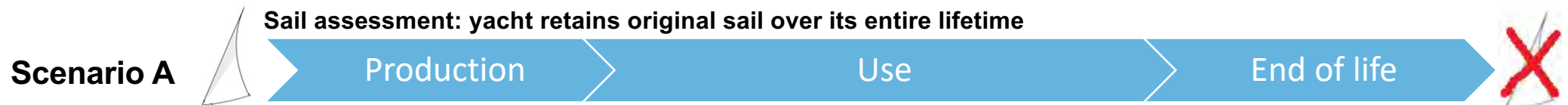
- Terminology
- Goal and scope definition of the LCA
- Life cycle inventory analysis (LCI) phase
- Life cycle impact assessment (LCIA) phase
- Life cycle interpretation phase
- Reporting and critical review of the LCA
- Limitations of the approach
- Relationship between the LCA phases
- Conditions for use of value choices and optional elements

Integrating Different Life Cycle Assessments

Deciding how to allocate the production and end of life phases of an Assessment.



Project: Yacht



Why is LCA important for the marine sector?

There is increasing pressure from a range of stakeholders to tackle climate change and deliver a circular materials economy.

- Investors
- Customers
- Supply chain
- Regulators
- Management and staff

Why is LCA important for the marine sector?

LCA offers opportunities for better environmental performance.

- Insights into ways to reduce energy and material costs;
- Less volatility in supply chains;
- Brand benefits;
- Informs new product development;
- Reduced cost of compliance;
- Potential for new revenue streams.

Why is LCA important for the marine sector?

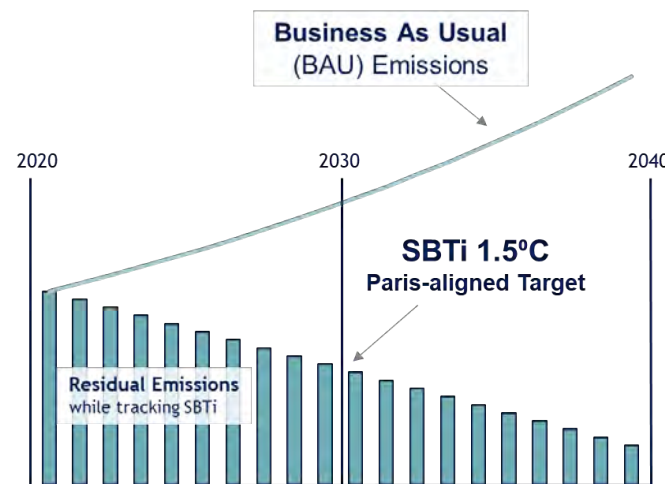
By 2025 we expect that...All vessels operating in UK waters are maximising the use of energy efficiency options. All new vessels being ordered for use in UK waters are being designed with zero emission propulsion capability

Clean Maritime Plan (July 2019)



The European Green Deal includes shipping within the **90% emission reductions by 2050** targets for the transportation industry.

(EU 2019)

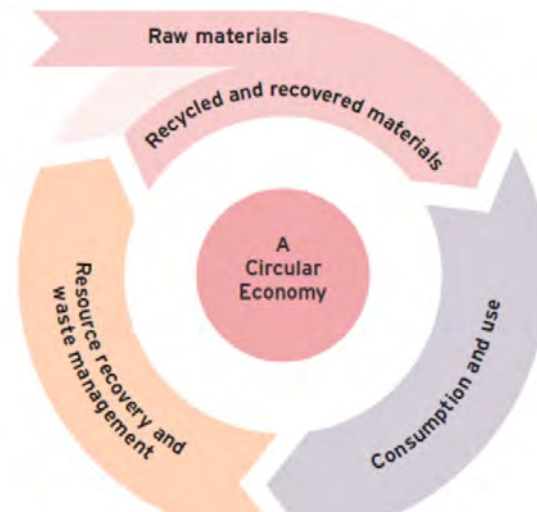


Why is LCA important for the marine sector?

There are plans to **ban diesel engines** from Amsterdam's central canals by 2025.

France is leading with regulations governing the dismantling and recycling of recreational vessels, having implemented the principle of **extended producer responsibility** by establishing eco-contributions to be paid by boat manufacturers and by boat buyers for financing recycling of boats.

Austria and Germany have already forbidden the disposal of FRPs to landfill and more member states are expected to follow suit.





European Boating Industry Webinar

Jill Savery

Sustainability Director, 11th Hour Racing

Michel Marie

LCA & Database Expert

MarineShift360

A Life Cycle Assessment Tool for the Marine Industry

MarineShift360

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

- Deliver a marine industry Life Cycle Assessment tool that facilitates smart choices within design and manufacturing processes.
- Use industry wide data to continuously develop the tool, designed specifically for the marine industry.



What is MarineShift360?

ABOUT MarineShift360

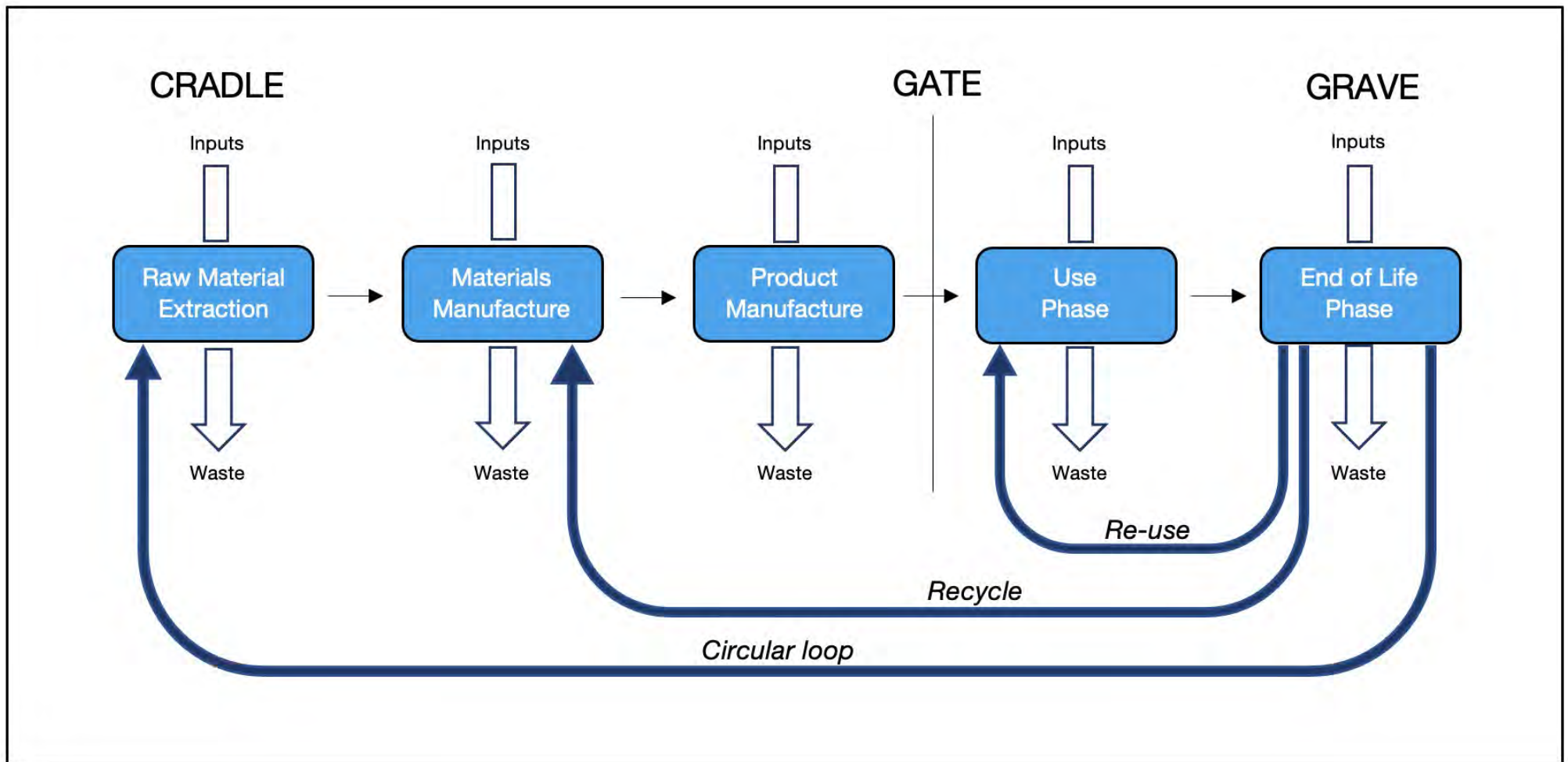
- Backed by **11th Hour Racing as Founding Sponsor**, MarineShift360 is a purpose-built marine industry life cycle assessment tool.
- This simplified life cycle assessment(LCA) tool enables the user to evaluate and compare materials and processes, investigate alternatives, and drive innovation to allow informed, environmentally and economically sustainable choices.

ISO PEER REVIEW

- The MarineShift360 methodology and software have been independently evaluated and tested by stakeholders and life cycle experts throughout development.
- **MarineShift360 is an ISO 14040:2006 & ISO 14044:2006 compliant and certified life cycle assessment(LCA) tool.**

Disclaimer: LCA results herein are calculated using MarineShift360, which is under development and is currently in beta stage. No statements regarding accuracy are made and results may change over time as the development of MarineShift360 continues.

What is LCA Methodology?



Environmental Impact categories in MarineShift360

Global warming

Global warming is expressed in kg carbon dioxide equivalent (kgCO₂e).

Mineral resource scarcity

Mineral resource scarcity is expressed in kg copper equivalent (kgCue).

Energy consumption

Energy consumption is expressed in megajoules (MJ).

Water consumption

Water consumption is expressed in cubic metres (m³).

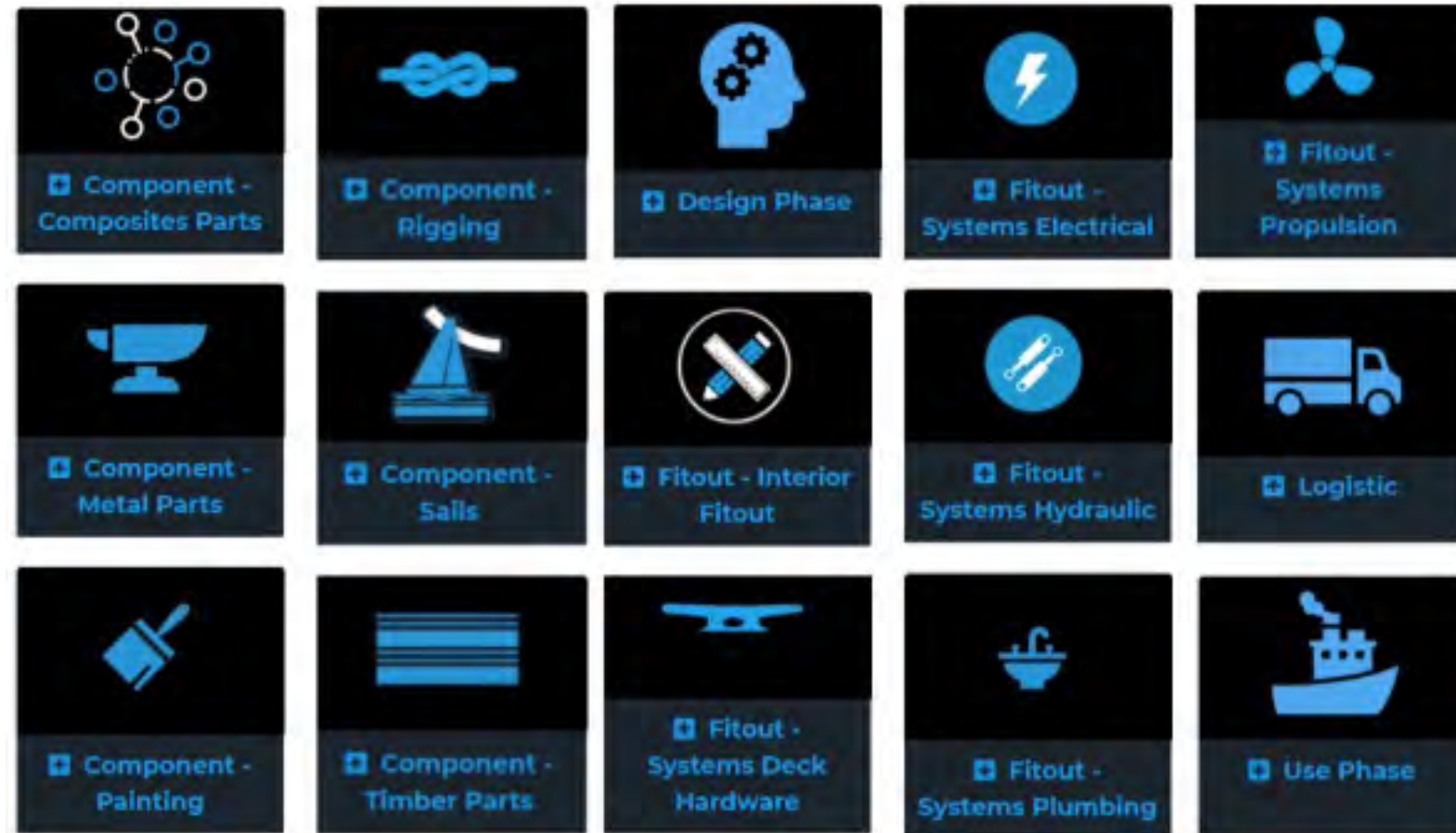
Marine eutrophication

Marine eutrophication is expressed in kg of nitrogen equivalent (kg Ne).

Waste metric

Waste is expressed as a percentage (%).

MarineShift360 LCA Methodology



Project - OPEN60 GENERIC

[Edit project details](#)

Templates

Component - Composites Parts

Component - Composites Parts Plug and Mould only

Component - Composites Parts without Plug and Mould

Component -

Assessments

Group filter:

Assessment	Template	Life-Cycle Phase	Quantity	View in Dashboard
Boom - Part	 Component - Composites Parts		1.00	
Deck Shell - Mould and Part	 Component - Composites Parts		1.00	
Fitout - Deck Hardware	 Fitout - Systems Deck Hardware		1.00	

- Dashboard
- Report
- Import
- Export
- Compare
- Copy

Intensity Metric

Intensity denominator value

Intensity denominator unit

OPEN60 GENERIC - Deck Shell - Mould and Part

Dashboard Results Edit assessment details

Elements

- ★ Plug
- ★ Mould
- ★ Manufacturing Composites
- ★ Assembly Composites
- ★ Transport

- Production/Purchase
- Production/Transport
- Use
- End of Life



Did you know that there is a UK Sustainability Working Group dedicated to pioneering the circular economy for fibre reinforced composites. They have put together ‘A Vision and Roadmap for Sustainable Composites’ report, sharing a vision of a sustainable future for composites and what is needed to get there. [Find out more](#)

To cover commonly reused materials please select “Material – Reused” from the drop-down “Material” menu. The second use of material is essentially “free” of burden with all impacts of zero at the gate stage. Only incoming transport impacts need to be included by selecting the correct transport mode and distance in the “Production/Transport” tab.

Part dimensions ⓘ

Area (m2)

77.5

Part dry fibre ⓘ

Item	Ordered quantity (kg)	Final quantity (kg)
Dry fibers - Carbon Intermediate Modulus ▾	190	140

+ Add Another

Global warming

16995.08

kg CO2e

Mineral resource scarcity

52.10

kg Cue

Energy consumption

457301.82

MJ

Water consumption

279.08

m3

Marine eutrophication

11.11

kg Ne

Waste production

73.82

%

Project - OPEN60 GENERIC

Breakdown

Table View

Compare

Boom - Part 1.00	Deck Shell - Mould and Part 1.00	Fitout - Deck Hardware 1.00	Fitout - Electronic 1.00	Fitout - Equipment 1.00	Fitout - Interior Fitout 1.00
Fitout - Machinery 1.00	Foil Cases - Plug, Mould and Parts 2.00	Foils - Plug, Mould and Parts 2.00	Hull Shell - Plug, Mould and Part 1.00		
Hull, Deck, Structure Assembly 1.00	Internal Structure - Mould and Parts 1.00	Keel - Bulb 1.00	Keel - Keel Fin 1.00	Mast - Part 1.00	Outriggers - Parts 2.00
Rig - Hardware 1.00	Rigging 1.00	Rudder Cases - Plug, Mould and Parts 2.00	Rudders - Plug, Mould and Parts 2.00	Sails - A3 1.00	Sails - FR0 1.00
Sails - J1 1.00	Sails - J2 1.00	Sails - J3 1.00	Sails - Mainsail 1.00	Sails - MH0 1.00	Sails - Storm Jib 1.00

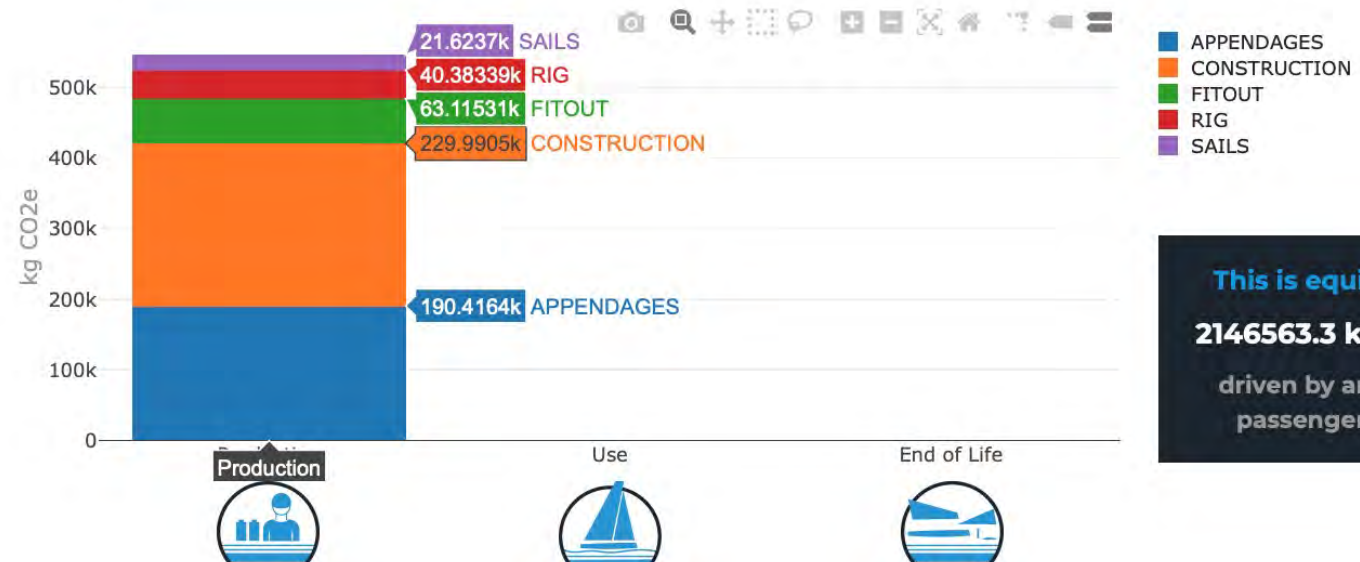
Graph metrics by: Group

Global warming ⓘ



545.53k
kg CO2e

Global warming - Life-cycle breakdown



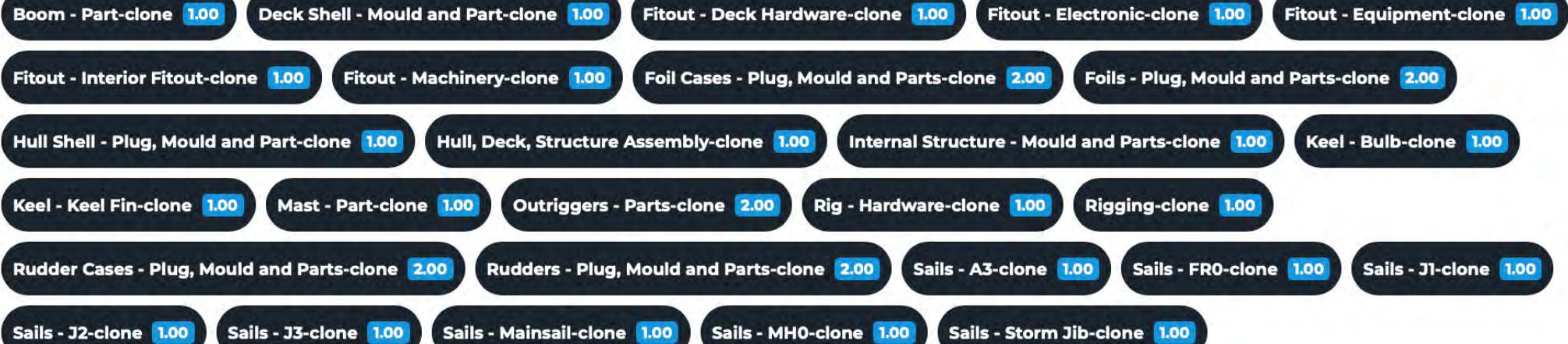
This is equivalent to
2146563.3 kilometers
driven by an average
passenger vehicle

Project - OPEN60 GENERIC-3

Breakdown

Table View

Compare



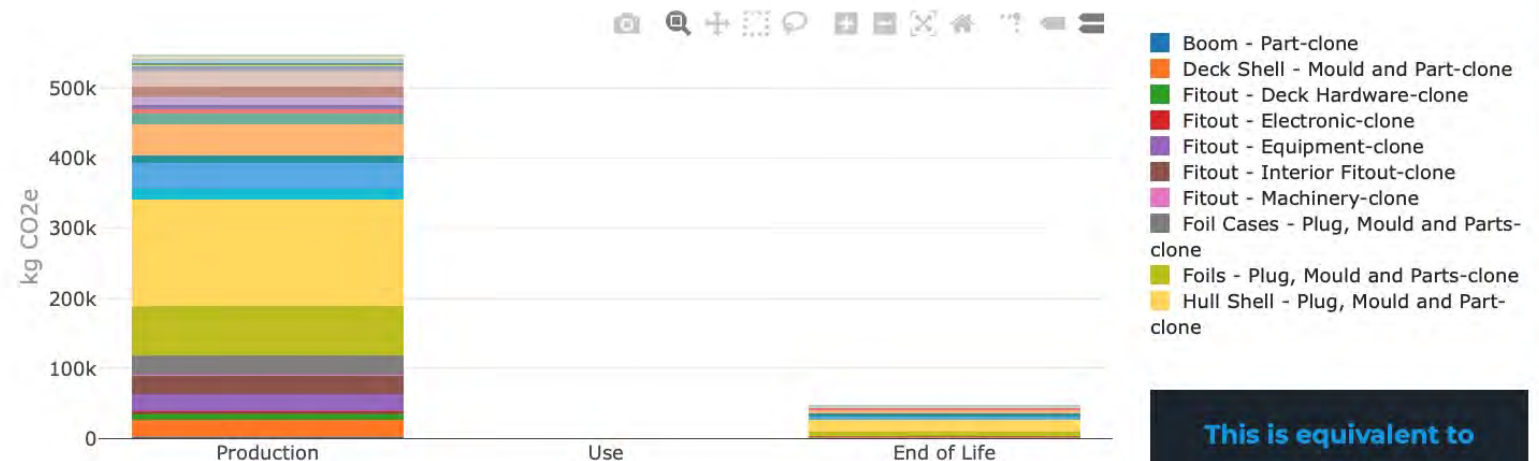
Graph metrics by: Assessment ▾

Global warming ⓘ



593.50k
kg CO2e

Global warming - Life-cycle breakdown



This is equivalent to

2775718.6 kilometers

Project - OPEN60 GENERIC

Life-cycle

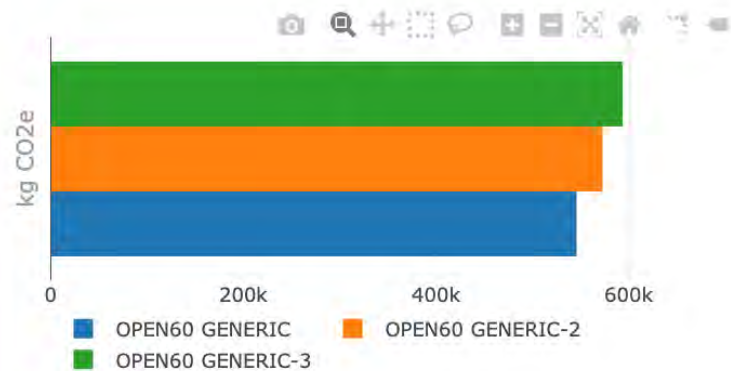
Breakdown

Select other projects to compare with (up to a maximum of 3):

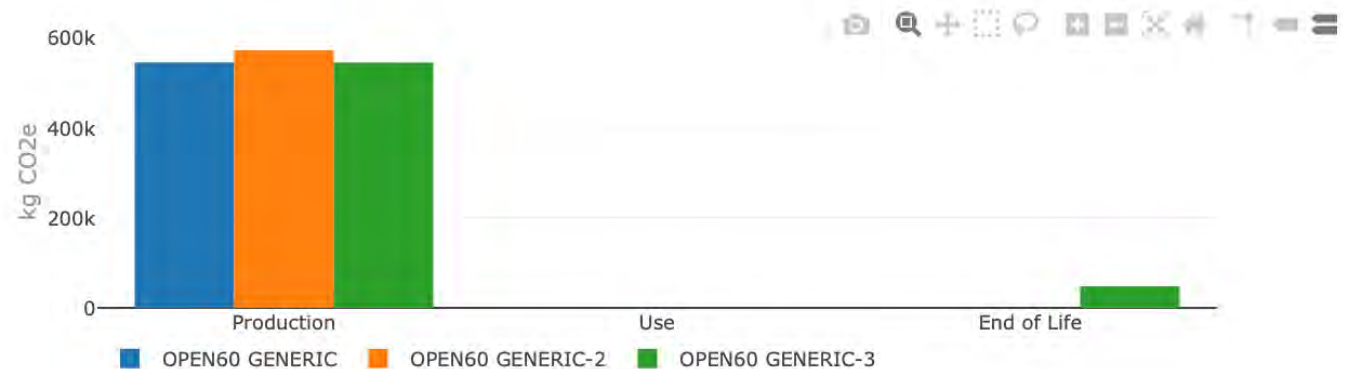
* OPEN60 GENERIC-2

* OPEN60 GENERIC-3

Global warming *i*



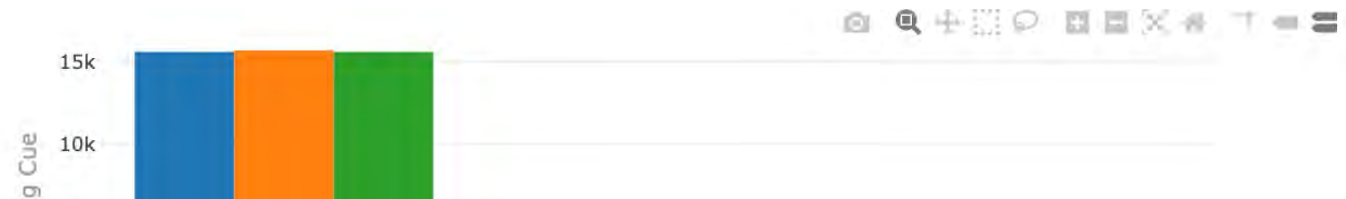
Global warming - Life-cycle breakdown



Mineral resource scarcity *i*

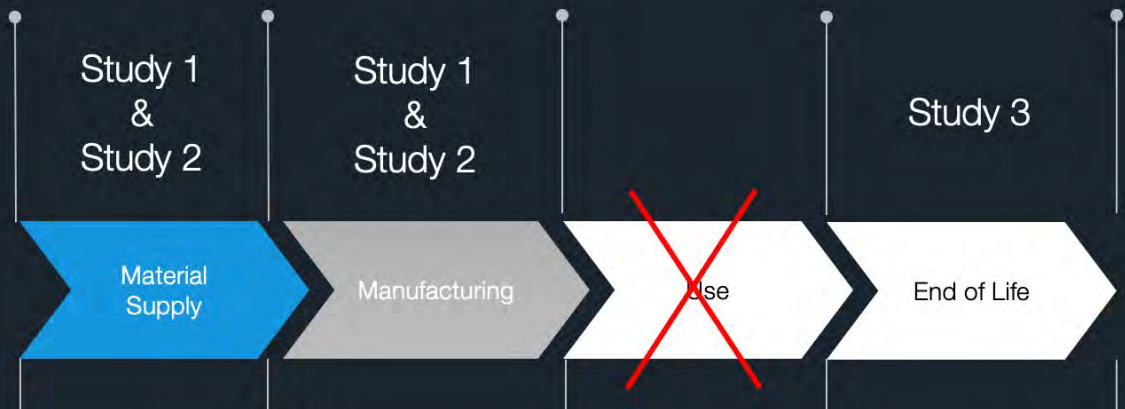


Mineral resource scarcity - Life-cycle breakdown



SCOPE AND BOUNDARIES Generic Open60

Emissions from the manufacture of a generic Open60 in launch configuration

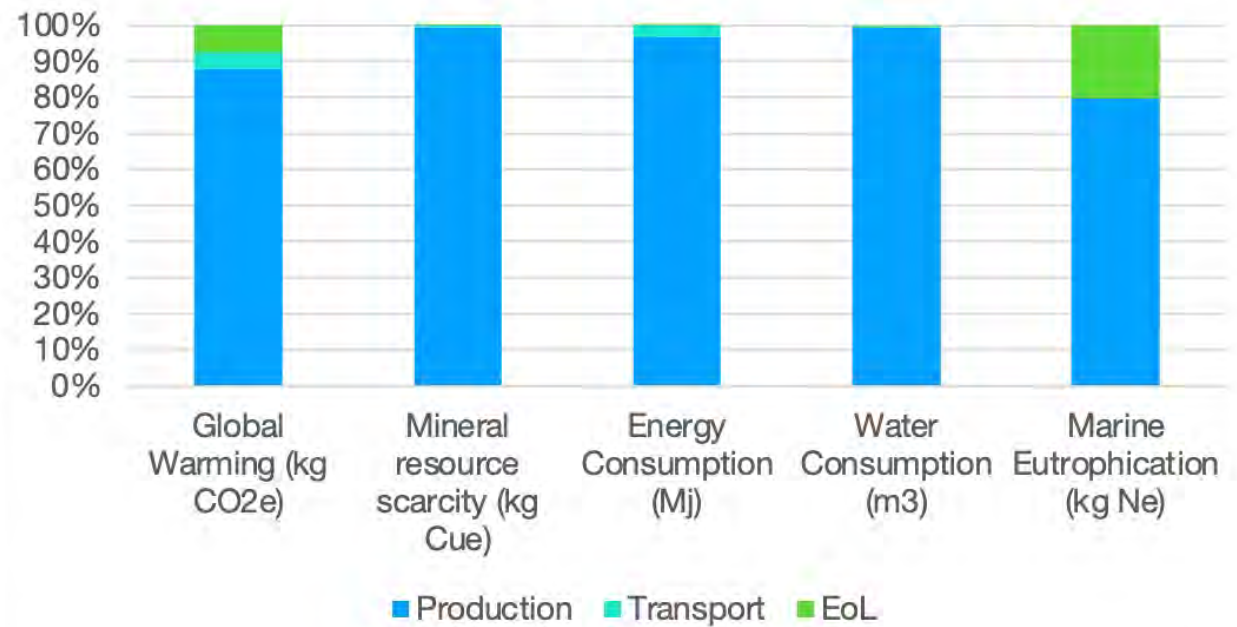


Study 2
material transport added

Emissions not included

- Capital Investments
- Employee commuting
- Use Phase

OPEN60



How is MarineShift360 Database developed?

Primary Data-points

- Using the Ecoinvent3.6 library, licensed data provider calculated the various data-points with the tool SimaPro9.1.
- The list of data-points covers the following categories:
 - Primary Materials
 - Utilities
 - Waste and End of Life
 - Transport

Derived Data-points

- For a series of manufacturing processes and materials specific to the marine industry, the primary datasets were derived using the licensed database.

How is MarineShift360 Database developed?

Derived Data-points

- The inventories of derived data-points have been developed using the following sources:
 - Inventory calculated with an algorithm developed using the marine composite industry best practice.
 - Inventory based on algorithm developed with marine industry pilot partner data collected in 2019.
 - Inventory estimated using data from MS360 marine industry pilot partners.
 - Inventory estimated using data from literature study.
- The categories covered by the derived data-points are:
 - Prepreg manufacturing processes, Laminating processes
 - Yard consumables
 - Metal fittings
 - Sail material and sail making processes
 - Running rigging, Standing rigging

How is MarineShift360 Database developed?

Environmental Impacts and Assessment Methods

- Two environmental impact assessment methods have been used in the generation of datasets, leading to the assessment of 5 different impacts.
- Environmental Impacts – ReCiPe 2016
- Environmental Impacts – Cumulative Energy Demand v. 1.11

MarineShift360 Marine Industry Survey

23 marine industry stakeholders responded to an open survey by MarineShift360 (Aug 2021) representing 19 organisations. Responses were split between UK, France, Germany, Italy, Spain, NZ and USA.

- **91% of those responding** said they currently, or intend to, undertake life cycle assessment.
- **67%** (14 out of 21) are currently using, or intend to use, MarineShift360.

Why is LCA important for the marine sector?

“Life cycle assessment provides the data to help you make smart decisions.

As a result of using MarineShift360 we are planning to make significant changes to our operations and to our current supply chain.

More importantly, MarineShift360 will form the backbone of how we go about designing and developing new products moving forward.”

Ollie Taylor
Head of Commercial Development
Williams Jet Tenders
MarineShift360 pilot partner



MarineShift360

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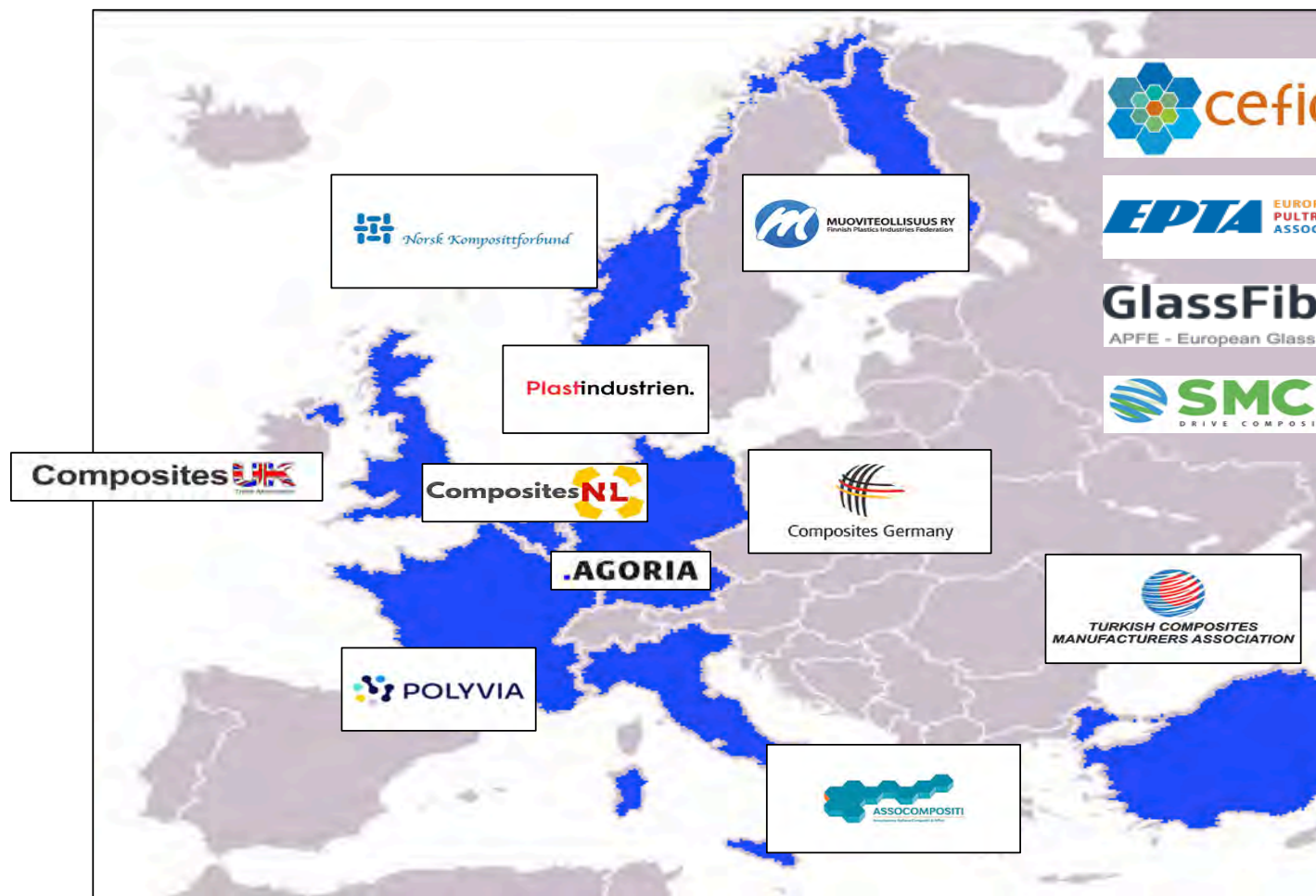


EuCIA's EcoCalculator

Ben Drogts
EuCIA



EuCIA is the representative in Europe of 14 National Composite and Sector Associations



UP/VE
Unsaturated Polyester &
Epoxy Vinyl Ester Resins



**EUROPEAN
PULTRUSION TECHNOLOGY
ASSOCIATION**

GlassFibre Europe
APFE - European Glass Fibre Producers Association



DRIVE COMPOSITE INNOVATION

Composites UK
The Association of Composite Manufacturers

Composites NL
The Association of Composite Manufacturers

.AGORIA

POLYVIA



ASSOCOMPOSITI

Composites Germany



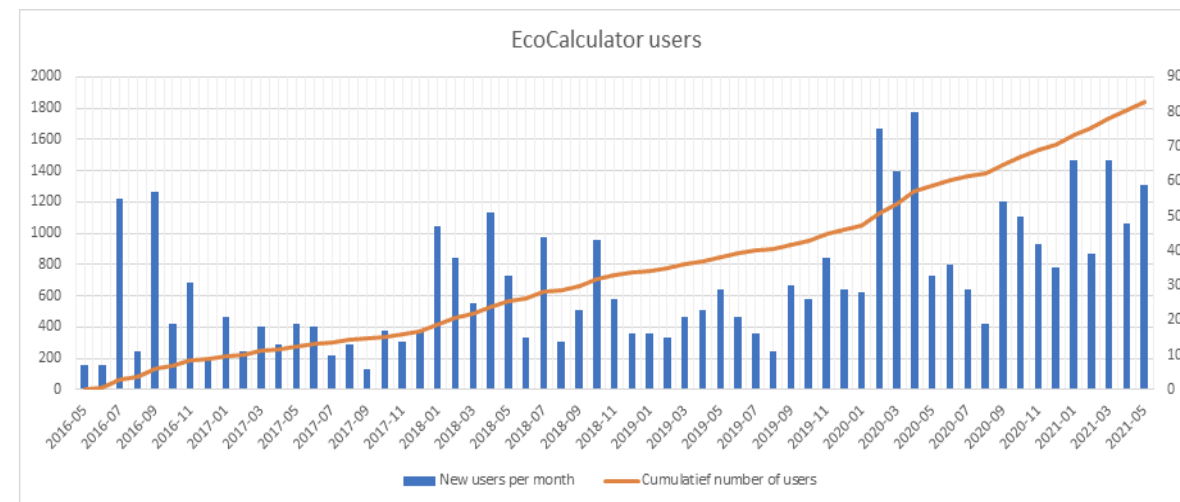
**TURKISH COMPOSITES
MANUFACTURERS ASSOCIATION**





Initiative of EuCIA: the EcoCalculator for Composites Parts

- **EuCIA has developed the EcoCalculator** in cooperation with **EY Cleantech and Sustainability Services** and **BiinC**.
- The Eco Calculator allows the user to calculate the **environmental impact of the production of a composite part**, without the need of a deep know-how of Life Cycle Assessment processes.
- Already close to 2000 unique users





What does the EcoCalculator do

- The EcoCalculator is an on-line tool, easy to use
 - Selection from a wide range of composite raw materials (continuously extended)
 - Selection from a series of composite production processes
- The tool generates **an Eco Report, a Summary Report and SimaPro 8.2 Export**
 - Use of transparent and uniform sector methodology for processes **following ISO 14.040/044**
 - Based **on Industry generated, peer reviewed, quality data** as well as material data from existing **eco inventories** (EcoInvent)
 - The Eco Report is based on EU industry average figures for the conversion processes. Third party verification on the processes has not been performed and this is therefore **not an Environmental Product Declaration (EPD)**
 - The output of the tool can be used as input for full life cycle assessments through the SimaPro 8.2 report

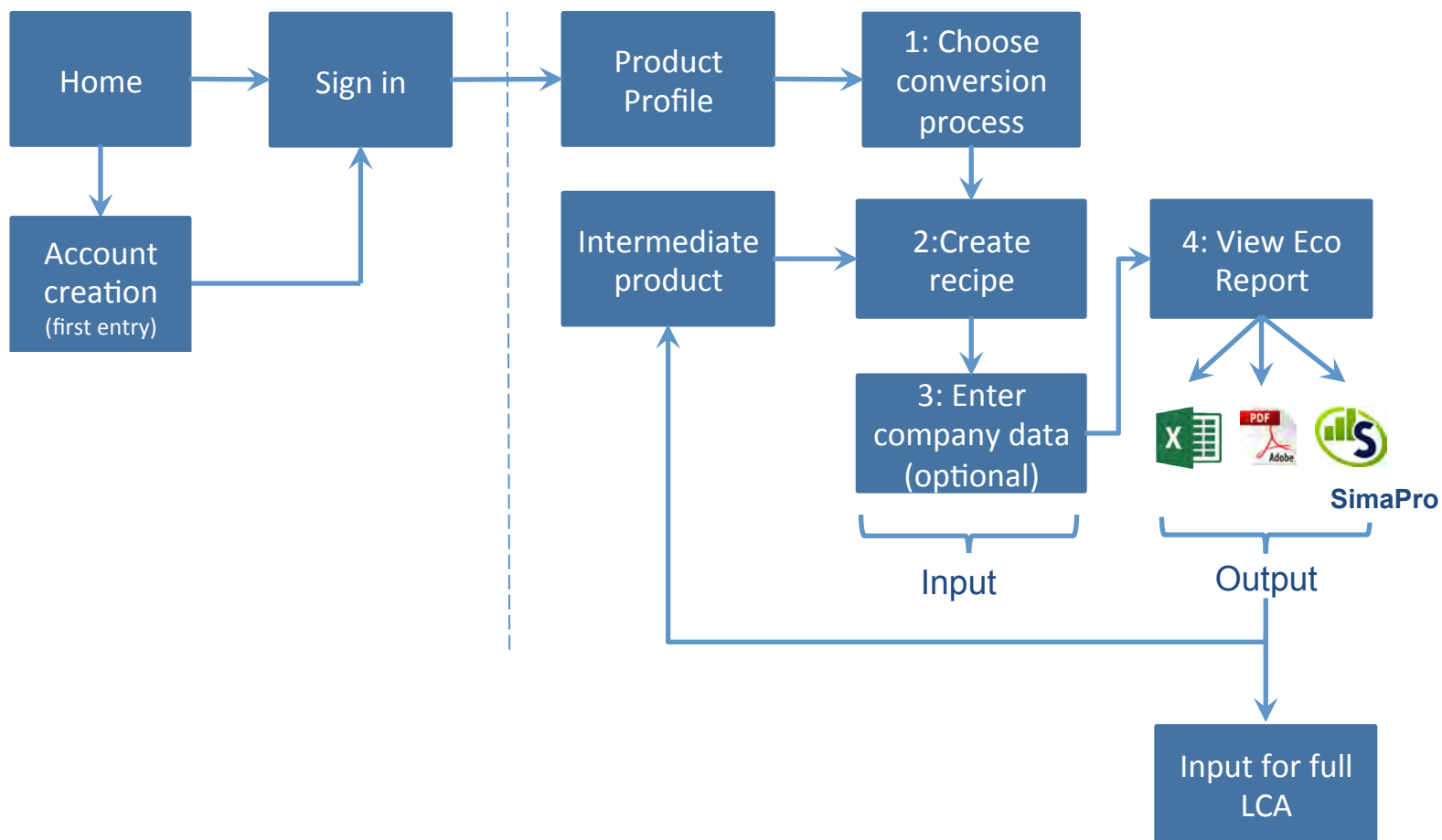


System Boundary: Cradle to Gate





The EcoCalculator in practice





The Eco Calculator is easy to use:

- Free of charge registration and tutorial video
- Interactive input of data related to the product to calculate
- Drop down menu's for input of conversion processes and materials
- Possibilities to adapt standard input values towards own production situation



ECO IMPACT CALCULATOR for composites

Welcome

This is the trial version of the EuCIA Eco Impact Calculator for calculating the environmental impact of your composite products from cradle-to-gate: from the raw materials up to the point-of-sale. Users can calculate, save and export the environmental impacts of as many different composite products and components as they seem fit.

The Eco Impact Calculator incorporates a pre-defined set of materials and processes. It also allows the user to enter own data, generating a more precise result for individual composite producers. A report in pdf-format can be generated that summarizes the impact of the composite product under study.

The Eco Impact Calculator will be offered free of charge until Juli 2017.

The materials and processes are under continuous review for quality and consistency, and new data is added to expand and improve the tool. If you are missing certain crucial materials or processes, please do not hesitate to contact us. We sincerely hope that the Eco Impact Calculator can help you and the composites industry to face the opportunities and challenges ahead.



For more information on the Eco Impact Calculator and its development, please go to the [Background and disclaimer](#).

[Register here!](#)

Already have an account?

Email

Password

☐ Remember me [Forgot your password?](#)

[Log in](#)



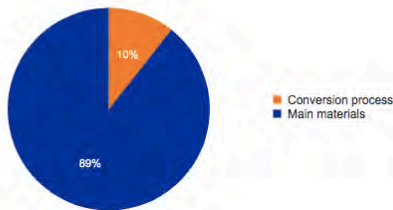
The Eco Calculator generates an Eco Report (pdf):

- **Carbon Footprint** according to the GHG Protocol
- **Cumulative Energy Demand** calculated with CED 1.09
- **Total Impact Score** according to The International Reference Life Cycle Data Systems (ILCD)

Environmental score

Carbon footprint and Cumulative energy demand (CED)
 The carbon footprint (calculated with GHG Protocol, v1.01) of 1 demo boat hull is equal to 309.25 of kg. The cumulative energy demand (calculated with CED 1.09) of 1 demo boat hull is equal to 6459.56MJ. The following figures show the environmental impact of the product.

Carbon Footprint



Carbon Footprint:

309.25 kg

Cumulative energy demand:

6459.56 MJ

Category	Amount	Unit
Climate change	3.08e+2	kg CO2 eq
Ozone depletion	2.81e-5	kg CFC-11 eq
Human toxicity, non-cancer effects	2.44e-5	CTuh
Human toxicity, cancer effects	2.11e-5	CTuh
Particulate matter	1.34e-1	kg PM2.5 eq
Ionizing radiation HH	1.91e+1	kBq U235 eq
Ionizing radiation E (interim)	4.78e-3	CTUe
Photochemical ozone formation	1.12e+0	kg NMVOC eq
Acidification	1.26e+0	molc H+ eq
Terrestrial eutrophication	2.53e+0	molc N eq
Freshwater eutrophication	1.61e-2	kg P eq
Marine eutrophication	2.36e-1	kg N eq
Freshwater ecotoxicity	7.63e+3	CTUe
Land use	1.90e+2	kg C deficit
Water resource depletion	8.62e-1	m3 water eq
Mineral, fossil & ren resource depletion	5.67e-3	kg Sb eq



Using the Eco Calculator

- The Eco Calculator can be used Free of Charge: <https://ecocalculator.eucia.eu/>
- The tool will continuously improve:
 - Additional raw materials: input from data bases and material producers (peer reviewed)
 - Additional conversion processes; input from composite parts producers
 - Regular updates of back ground data
- The Eco Calculator has been used already more than 2000 times by a large variety of users





Thank you!

For more information, please contact:

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Thank you for joining!

 European Boating Industry

 @EBI_Boating

 europeanboatingindustry.eu