

11th Hour Racing Team IMOCA 60 Sustainable Design & Build Report - 2021 -

DIGITAL FOOTPRINT OF AN IMOCA



Supporting the main report,
this document describes the environmental impacts
associated with digital use during the design and build of an IMOCA

Measurements used include
kWh (Kilowatt hours, Greenhouse gas (tCO₂e) or (kgCO₂e)

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DISCLAIMER

No warranty or guarantee of any outcome or result is made. Whilst great effort and care has been taken when preparing the contents of this report, certain assumptions and estimations may change over time.

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INTRODUCTION

Acknowledging the growing impact of digital and online¹ use, and recognizing the fact that performance sailing is reliant on a significant amount of research and development, the team included an assessment of the digital footprint² associated with the design & build process of their IMOCA

OVERVIEW

The 11th Hour Racing Team has been tracking their overall GHG emissions, including the digital footprint calculated for the 2019 & 2020 annual reports.

Here we include an overview of the digital impacts related to the contracted services for the design and build of the team's IMOCA, 11-2.

11th Hour racing team IMOCA - 11-2	Digital footprint	Digital % of total
Design & Build 2019-2021	16.49 tCO2e	3%

METHODOLOGY

The inventory of services used that have been calculated include Google workspace, email and website traffic, digital asset cloud storage, computer time and web searching, sail design and online server use associated with yacht design and analysis.

The method for calculating the GHG emissions of the Team's digital services has been through a combination of the UK GHG Reporting Protocol, direct inputs (where number of servers running, energy required, and the carbon intensity of energy sources used are known), online research and estimations³ (Including online data storage and transfer, office emails, conference calls and communications), and specialist input⁴.

¹ A [recent report](#) from Bristol University highlighted Netflix streaming at 100gCO2e per hour

² See Annexe/Inclusions for team's definition of Digital footprint

³ See annexe for list of assumptions and estimates

⁴ Sylvain Baudouin - [The Shift project](#), provided guidance on calculation of digital impacts. Additional support with regards to the definition of 11th Hour Racing team's digital footprint was provided by Craig Simmons, Anthesis

STARTING POINT

CASE STUDY 2019

The inventory of digital services contracted in 2019 was as follows:

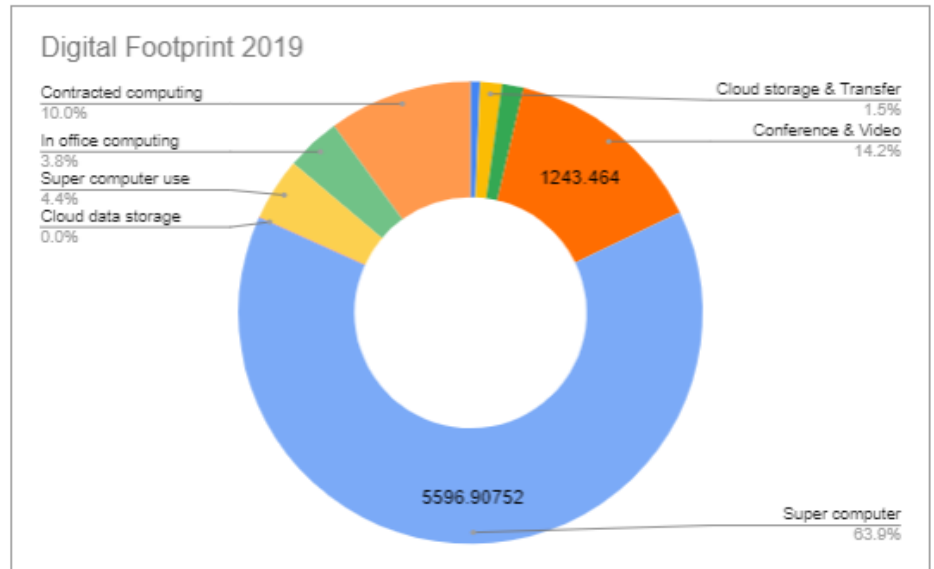


Figure: Breakdown of teams digital footprint by use 2019

AERO ANALYSIS

The research and development associated with the aero analysis, Contractor 1 in 2019 was calculated as follows:

- Super computer use - [IRIDUS computer cluster](#), University of Southampton
- Data transfer and storage
- Estimated in-house computer time and conference calls

SUPER-COMPUTER		
<p>IRIDUS 5 is in green 500 list 2017 (#251 in overall top 500) , total power 864.5 KW, total cores 20400</p> <p>Analysis for the Team used 307,200 core hours, with an estimated total consumption of 13,016Kwh.</p>	<p>Using the 2019 UK energy intensity factor 0.43, the total impact of IRIDUS was 5,597 kgCO₂e</p>	<p>Supercomputer use represented 99% of the contract impacts</p>
CONTRACT TOTAL	5.63 tCO ₂ e	

2019 TOTAL

Table 8: digital and online services

Sector	Inclusions Breakdown	tCO2e
Aero analysis Contractor 1	In-office computer system Cloud storage and transfer Super-computer use	5.63
Boat design Contractor 2	Refit design Performance analysis In-office computer system Cloud storage and transfer Super-computer use	1.89
Design coordination Contractor 3	In-house design	0.16
Total		7.69tCO2e

The total footprint for digital services contracted in 2019 was **7.69 tCO2e**.

While still a relatively small total at 7.69 tCO₂ in 2019, this does reflect the impacts of the digital sector worldwide, [estimated at 3.5%](#) of global GHG emissions or the equivalent of the entire aviation industry. More importantly, the global impact of digital use is set to increase by up to [14% by 2040](#), underlining the importance of understanding and taking responsibility for impacts in this sector.

DESIGN & BUILD DIGITAL FOOTPRINT

The supplier inventory for the design and build of 11-2 includes:

- A detailed calculation of digital use by core design and build group
- An estimate for other suppliers and contractors

The digital footprint associated with the full design and build process is totaled here:

Digital footprint - 11-2	Design & Build group	Other suppliers
2019 Research and development	7.69	
2020 Design and build coordination	2.79	0.5
2021 Design and Build	2.79	1.0
TOTAL	16.49 tCO2e - 3% of build footprint	

DIGITAL SOBRIETY

Digital services applied to the design & build are both an advantage in terms of reducing build time, trials & errors, and played a significant effect in limiting travel.

On the other hand the growing capacity of digital tools mean they are responsible for a growing environmental impact of their own.

Reduction measures the team put in place include:

1. The net carbon emissions associated with the Team's Google Workspace platform is zero. This is due to renewable energy purchases to offset the emissions from the Google data centre energy use. Google matches 100% of the electricity they use with renewable energy, including the Google cloud. [Visit Google's environmental report](#) (pgs 13, 24-34) for their emissions statement.
2. The Team uses Kinsta for its website hosting which uses the Google Cloud Platform.
3. The Team uses Image Relay, a certified B-Corp, for its Digital Asset Management. They use Amazon Web Services to hold the digital assets which exceeded 50% renewable energy usage for 2018 (latest available data) (n.d., AWS).
4. The **Aero analysis - Consultant 1** uses two supercomputers at the Wolfson Unit at the University of Southampton which have been rated in the Top 500 of the world's greenest machines. (Greenlist, 2013, 2017).

Additional considerations would include:

- Green web design and hosting
- Sourcing digital services that are powered by renewable energy tariffs can provide significant impact reductions (In certain cases a factor of ten or more)
- Using data compression where possible
- Minimizing email content and quantity, and cleaning out inboxes
- Turning off cameras during video conferencing which can [reduce impacts by 96%](#)
- Virtual conferencing is [still a lot better](#), one study suggesting a conference call might produce just 7% of the impact of an in person meeting. The same study indicated that this is still the case even for car rides for distances less than 20 km.
- Careful selection of replacement hardware

COMMENTARY

This study is the result of 11th Hour Racing Team's work to understand the contracted **digital footprint** as it pertains to the design & build of an IMOCA. This was done by including the digital use of key contractors to the process, the study does not include additional inventory impacts specific to external contractors such as, utility use associated with the heating and lighting of contractor infrastructures⁵.

The study measured digital footprint only, and does not represent the other, and certainly larger impacts associated with products and services provided, such as material, transport, staff travel.

As mentioned in the exclusions table below, the digital footprint was calculated on use phase only, unless specifically included in certain estimations. No upstream, manufacturing or end of life impacts of digital hardware⁶ was accounted for.

As digital footprint is directly related to energy use, it is worth noting that renewable energy, and regions with low intensity factors for energy use, will significantly reduce the digital use impacts.

⁵ Assessment of this sector is for the contractor/organization to directly monitor as part of their Scope 2 energy consumption onsite.

⁶ [The Shift Project](#) suggests a multiplier factor of 2 would give an indication to account for the upstream and end of life impacts of hardware, for contractor/organizations to correctly assess this impact requires them to include hardware and material purchases in their Scope 3 calculations.

APPENDIX

TOOLS AND REFERENCES

Inclusion	Boundary & Factors
UK GHG Reporting Protocol	Annual conversion factors were used for tons CO ₂ e calculations with the exception of: <ul style="list-style-type: none"> - Electricity, where the national emission figures were used. - Water, being only a small percentage of the total GHG emissions footprint, the UK conversion factors (as opposed to using different factors per country visited) were used for all locations.
The MarineShift360 Life Cycle Assessment (LCA) tool	MarineShift 360 was used for the lifecycle analysis of the build of the team's IMOCA 11-2. The tool includes a Digital footprint template that was used as a reference for this study
Other sources	Certain sectors required additional research, and sources such as Ademe were used to provide the best estimations.
Digital footprint	<p>The Team has made a specific effort to include the digital footprint of internal team operations, as well as the design and analysis associated with the Team's contracted boat build process</p> <p>Computing time, energy consumption, as well as the materiality of online services have been included ranging from texts and messaging at one end of the scale to super-computer time at the other</p> <p>Where possible direct energy consumption has been measured to generate emissions. When not possible, estimations have been applied using the best possible researched data.</p>
Data storage & transfer	1GB - 0.43 kWh
Conference call	2GB.hr
Kwh Electricity	National annual intensity factor
Computer Kwh	0.2 kgCO ₂ e
Email	0.01 kgCO ₂ e
Text	0.000014 kgCO ₂ e
Web search	0.01 kgCO ₂ e
Remote workers	The impact of remote working was included by using the methodology provided by Anthesis 2020.
Exclusion	Boundary
GHG emissions are stated in CO ₂ e only	The breakdown of various GHG emissions was not included: carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), hydrofluorocarbons (HFCs), perfluorocarbons

	(PFCs) and sculpture hexafluoride (SF6) that comprise the final emission figures
Digital hardware	Unless specifically embedded in the researched factors used for calculating certain aspects of the digital inventory, no upstream, manufacturing or end of life impacts were accounted for in the digital footprint. The digital footprint comprises the use phase only.
Team digital footprint	The team's digital footprint is reported separately in their annual sustainability report

ACKNOWLEDGEMENTS

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IMPORTANT

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