International Olympic Committee

ENVIRONMENTAL IMPACT EVALUATION OF BRANDING AND SIGNAGE SOLUTIONS FOR EVENTS

SUMMARY – March 2021

FOREWORD

The International Olympic Committee (IOC) and the Union of European Football Associations (UEFA) have made great strides in integrating sustainability into their events, and have recently been investigating improvement opportunities in the area of branding and signage.

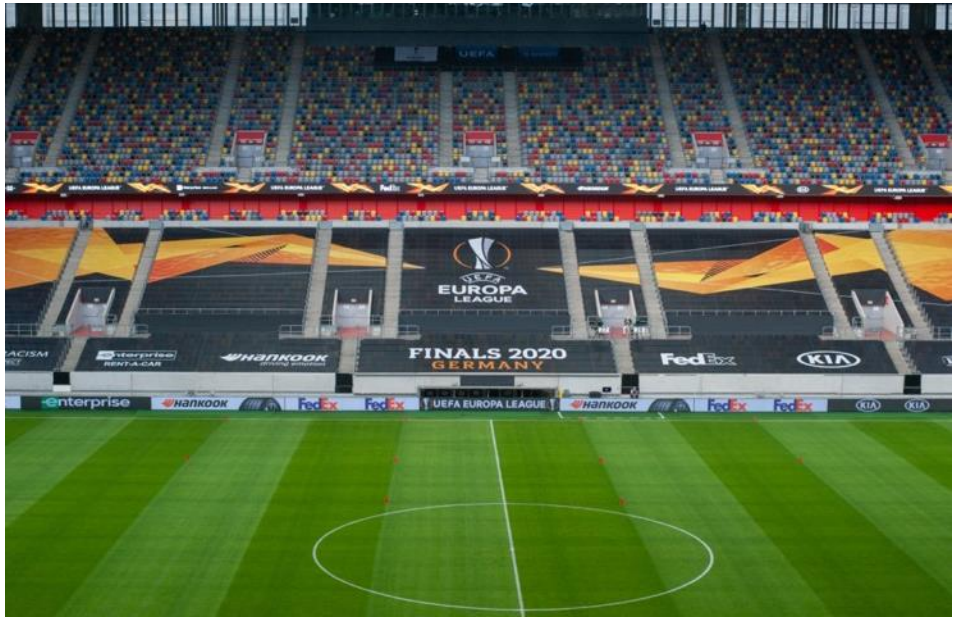
Among the various sustainability topics associated with event delivery, reducing the environmental impact of branding and signage solutions has proved a challenging task to date. Few commercially available solutions meet the needs of event organisers in terms of quality, ecology and cost. Besides, ecological claims are rarely supported by credible data based on product lifecycle evaluations, and few products are certified according to recognised ecolabels.

Branding and signage materials are not only a very visible aspect of events; they are often the number one source of single-use plastic, a large part of which is still being landfilled or incinerated. The impact of single-use plastics on ocean pollution has gained significant public attention over the last few years. The IOC, together with several major sporting bodies, joined the UN Environment Clean Seas campaign in 2018, recognising the need to take urgent measures to stop ocean pollution by plastics, and in 2020 published a guide entitled "Plastic Game Plan for Sports" to help the sports community address plastic pollution. UEFA also recently signed the Memorandum of Understanding to join forces on the UN Sustainable Development Goals.

In this context, the IOC and UEFA commissioned Anthesis, an independent consultancy specialising in environmental impact assessment, to compare lifecycle impact data for a range of branding and signage materials and develop guiding principles to help decision-making.

The present document is the result of this work. It covers over 40 materials, both commonly used materials as well as more innovative ones, and is a first attempt at improving the knowledge base on this topic. It provides:

- A framework to compare conventional products with alternative products marketed as more sustainable, across five main categories (hardboards, flexible graphics, structural materials, flooring, and self-adhesive decals and films);



- A comparative analysis of the environmental impacts of materials, with detailed results per lifecycle stage;
- A summary of key observations and recommendations for sourcing;
- Comprehensive information on the actual recyclability of the materials and their overall circularity score (using the circularity indicator of the Ellen McArthur Foundation) and guidance on end-of-life management in different contexts; and
- Case studies describing some of the more advanced solutions to reduce the lifecycle impacts of materials.

The findings of this study are being used to review and improve procurement criteria for branding and signage.
As leading sports organisations, the IOC and UEFA also wish to share these findings with other interested parties.
Our ambition is to raise awareness on this topic, while encouraging improvements in the quality and transparency of information available to event organisers.

We recognise that the findings of this study will change and evolve as new materials are developed, new products reach the market, and waste management facilities improve. We therefore welcome feedback from all stakeholders (event organisers, product manufacturers, signage specialists, procurement managers, etc.) in order to improve this knowledge base.

ENVIRONMENTAL IMPACT EVALUATION OF BRANDING AND SIGNAGE SOLUTIONS FOR EVENTS

SUMMARY

Prepared for the International Olympic Committee (IOC) and Union of European Football Associations (UEFA)

Anthesis

PRODUCTS & MATERIALS COVERED BY THE STUDY

Type	Format	Product	Description & application examples	Materials covered	Common industry names
Signage boards	Signage boards (hardboards)	Fluted plastic boards	Fluted / corrugated plastic boards for wayfinding, advertising hoarding, etc.	Polypropylene (PP), recycled polyproplyene Polypropylene with biobased filler	Akyprint, Corex, Corflute
		Foamboards	Alternative to fluted boards, similar applications	PVC foam PP foam Cardboard	Foamex, DISPA, Re-board
		Wood & fibre boards	Used for particular outdoor applications. Often hand-painted for high-quality graphics. *Ex. golf distance markers.*	Plywood Bamboo Fibreboard composite (agriwaste)	
		Transparent boards	High quality transparent sheets, *Ex. end-of-match media boards*	Acrylic (PMMA) Laminated safety glass	Acrylic, Perspex, Plexiglas, Lucite
		Durable signage boards	Long-term wayfinding signage, especially for strong outdoor conditions *Ex. signpost totems or traffic-like signage*	Aluminium composite Aluminium Plastic composite	Dibond, Raybond, Dilite, ACM
Flexible graphics	Banners	PVC banners	Multipurpose – section covers 4 different banner types (standard, blockout, mesh, flexible graphics)	PVC coating on PET textile	PVC banner
		Non-PVC banners	Multipurpose – section covers 4 different banner types (standard, blockout, mesh, flexible graphics) using PVC alternative materials	Polyolefin or polyacrylic acid coating on PET or PP textiles	PVC-free banners
	Graphic textiles	Graphic textiles	Printed fabrics *Ex. flags, drapes, table skirts, etc.*	PET, recycled PET Hemp	Polyester
Structures	Structural materials	Structural materials	Supports used to hold signage, basis for exhibition stands, etc.	Steel, aluminium, timber, plastic composite	
Flooring	Flooring	Flooring	Different flooring types including carpet, floor tiles, and paper covering	PP carpet PP tiles Paper floor	
Self-adhesive decals and films	Self-adhesive decals and films	Standard decals	General purpose decals, including indoor and outdoor variants.	PVC Polyolefin Paper Textile	SAV, vinyl, Phototex
		Specialist decals	Decals for specific applications – mirrored film, blockout, flooring (all-in-one decal, 2-part flooring system)	PVC, PVC with filler Metallised BOPET film	

METHODOLOGICAL APPROACH

A **Life Cycle Assessment (LCA)** approach was used to quantify and compare environmental impacts of products from the point of raw material extraction to their end of life, using four main indicators: **climate change, water usage, toxicity** and **circularity potential** (based on recyclability and circularity).

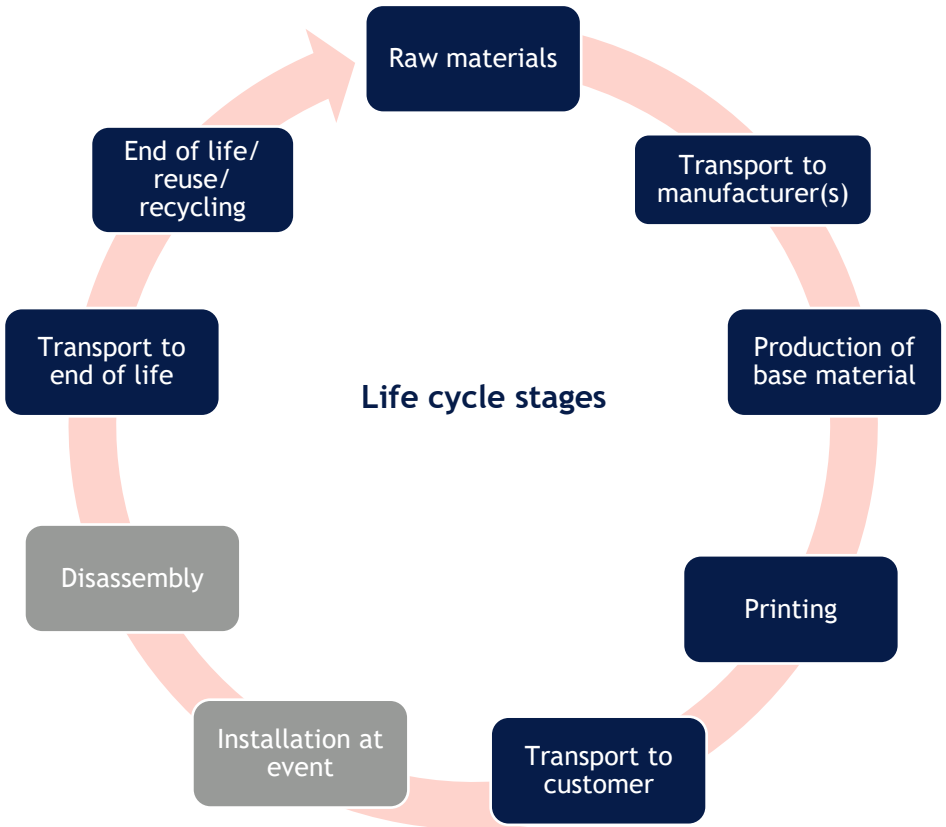
Key sources of data were:

- Supplier technical data and Life Cycle Assessment (LCA) studies
- Findings from The Ocean Race report "Sustainable Look and Overlay - Market Review" published in May 2020
- Existing Anthesis data and research
- Third party databases – e.g. Ecoinvent

Key assumptions

Since the individual circumstances will differ from case to case, a number of key assumptions were made to calculate average impacts per product type:

- **Transport** is modelled based on an *average*, equivalent to ocean & road shipping route from Taipei to Paris, applied per tonne of material shipped. Therefore if your product is heavier it will have a higher transport impact.
- **End of life** is assumed to be landfill in all cases.
- **Number of uses** is assumed to be one – it's understood that in many cases, branding assets are reused, but it was not possible to derive an average lifetime or number of uses.
- **Printing** is modelled as solvent printing.



CLIMATE CHANGE, WATER & TOXICITY ASSESSMENT

Each product is assigned an assessment indicator, based on the environmental impacts.
Product scores have been calculated according to their groupings. Hardboards and structural materials are in separate groups as they are heavier.

Climate Change

- Global warming potential
- Measured in CO_2e, carbon dioxide equivalent
- Calculated based on impact factors for different materials and processes
- Making product production and use less carbon-intensive

Lower impact – in the lowest decile.

Medium-low impact - in the lowest 40%

Medium-high impact - in the lowest 70%

High impact – in the top 30%

Water

- Water depletion
- Measured in m^3
- Calculated based on impact factors for different materials and processes
- Making product production less water-intensive.

Lower consumption – in the lowest decile.

Medium-low consumption - in the lowest 20%

Medium-high consumption - in the lowest 70%

High consumption – in the top 30%

Toxicity

- Calculated based on factors for freshwater and marine ecotoxicity
- This describes the potential for chemicals in the material supply chain or end of life to have toxic effects.

"Red flag" assigned where a product scores in the top 20% of its group for marine or freshwater toxicity. **This does not necessarily infer it is a toxic product, just that there is a higher risk of toxicity in its manufacture.**

RECYCLABILITY, CIRCULARITY & END-OF-LIFE ASSESSMENT

Each product is assigned an overall circularity & end-of-life assessment indicator, based on the recyclability, potential circularity, and ease of enabling circular practices for the product.

Recyclability

Recyclability is assessed based on whether the material or product is easy to recycle, and how widespread material recycling is globally. The assessment is based on material-to-material recycling, rather than downcycling.

- Material recycled in most regions worldwide.
- Material can be recycled in many regions but not all.
- Limited material recycling – typically materials require specialist processors, and recycling capacity is limited geographically.
- Little to no recycling. May include materials only recycled on pilot scale, or in only one or two locations globally.

Circularity

Circularity indicators used in this project use the methodology outlined in Ellen MacArthur Foundation's Circularity Indicators Project.

The indicators give a value between **0.00** and **1.00**, based on variables including:

- Use of recycled or reused material as material in production
- Proportion of product reused
- Proportion of the product recycled at end-of-life
- Efficiency of recycling process

For each product grouping, we use circularity metrics for two scenarios:

Typical circularity: based on typical end-of-life outcomes

Optimal circularity: best case scenario, assuming ideal conditions (e.g. reuse is possible, suitable offtake partners available)

Overall circularity & end-of-life assessment

The end-of-life assessment is based on both the recyclability assessment and circularity metrics.

This also considers the ease of implementing pro-circularity practice and potential barriers, e.g. recycling capacity only available in a different geographical region.

- Material or product is readily recycled in standard material collections or designed for reuse
- Reuse and/or recycling achievable with some small changes to practice.
- Reuse and/or recycling are achievable, but there may be some challenges (e.g. securing offtake partners in a different region).
- No reuse or recycling potential at end-of-life, or potential challenges in securing end-of-life partnerships

RED FLAG SUMMARY OF SIGNAGE & OVERLAY ELEMENTS (PART 1 OF 3)

The environmental impact indicators **assume single-use of products/materials** - see detailed results for information on multiple use

Signage / overlay element		Climate change	Water footprint	Toxicity	Recyclability	Circularity & end-of-life assessment
Hardboard signs		*Rows in grey are considered to be the industry standard in their class*				
Plastic fluted boards	PP board (Akyprint-type)	🟡	🟡		🟡	🟡
	Recycled PP board	🟢	🟡		🟡	🟢
	PP board with seaweed-based filler §	🟢 §	🔴 §	◇ §	🟡	🟡
Foamboards	PVC foamboard (Foamex-type)	🟡	🟡		🔴	🔴
	PP foamboard	🟡	🟡		🟠	🟠
	Paper-based board (DISPA-type)	🟢	🟢		🟢	🟢
Wood and fibre-based boards	Plywood board	🟢	Data unavailable		🟠	🟠
	Bamboo board §	🟢 §	Data unavailable		🟠	🟠
	Fibreboard made from agricultural waste §	🟢 §	🟡 §		🔴	🟢
Transparent boards	PMMA sheet (Perspex-type)	🟠	🟠	◇	🟠	🟡
	Recycled PMMA sheet	🟡	🟠	◇	🟠	🟢
	Laminated safety glass	🟠	Data unavailable		🟠	🟡
Durable signage boards	Aluminium composite board (Dibond-type)	🟠	🟡	◇	🟠	🟡
	Aluminium sheet	🔴	🟠	◇	🟢	🟢
	Recycled plastic composite board	🟡	🟡		🟡	🟢

§ We recommend that additional environmental information is obtained for these products prior due to variability in material sourcing or manufacturing processes

RED FLAG SUMMARY OF SIGNAGE & OVERLAY ELEMENTS (PART 2 OF 3)

The environmental impact indicators **assume single-use of products/materials** - see detailed results for information on multiple use

Signage / overlay element		Climate change	Water footprint	Toxicity	Recyclability	Circularity & end-of-life assessment
Flexible graphics				*Rows in grey are considered to be the industry standard in their class*		
PVC banners	Standard banner	●	●		●	●
	Blockout / building wrap banner	●	●		●	●
	Mesh banner	●	●		●	●
	Coated textile graphic banner	●	●		●	●
Non-PVC banners	Standard banner	●	●		●	●
	Blockout / building wrap banner	●	Data unavailable	◇	●	●
	Mesh banner	●	●	◇	●	●
	Coated textile graphic banner	●	●		●	●
Graphic textiles	PET textile (polyester)	●	●		●	●
	Recycled PET textile	●	●		●	●
	Hemp fabric §	● §	● §		●	●
Structural materials						
Structural materials	Steel	●	Data unavailable	◇	●	●
	Aluminium	●	●	◇	●	●
	Timber §	● §	● §		●	●
	Recycled plastic composite	●	●		●	●

§ We recommend that additional environmental information is obtained for these products prior due to variability in material sourcing or manufacturing processes

RED FLAG SUMMARY OF SIGNAGE & OVERLAY ELEMENTS (PART 3 OF 3)

The environmental impact indicators **assume single-use of products/materials** - see detailed results for information on multiple use

Signage / overlay element		Climate change	Water footprint	Toxicity	Recyclability	Circularity & end-of-life assessment
Flooring				*Rows in grey are considered to be the industry standard in their class*		
Floor coverings	PP carpet	●	●		●	●
	Paper-based floor covering §	●§	●§	◇§	●	●
Functional flooring	Recycled PP tile system	●	●		●	●
Decals						
Standard decals	PVC decals	●	●		●	●
	PVC-free decals	●	●		●	●
	Paper decals	●	●		●	●
	Textile decals (PhotoTex type)	●	●		●	●
Specialist decals	Blockout decals	●	●		●	●
	Mirror films	●	●	◇	●	●
	All-in-one floor decals	●	●	◇	●	●
	Two-part floor graphic system	●	●	◇	●	●

§ We recommend that additional environmental information is obtained for these products prior due to variability in material sourcing or manufacturing processes

Detailed quantitative results are provided in the full version of the report

KEY OBSERVATIONS – GENERAL PRINCIPLES

Material weight

- Overall environmental impact is heavily dependent on weight of product
- **In general, the lighter the product, the lower the environmental impact.**
- For **single-use elements**, product weight should be minimised and care should be taken to avoid overspeccing the material or product.
- For **longer lasting products**, there are tradeoffs between the impact of the material and durability.
  - For example, **recycled polypropylene (PP) floor tiles** have a much higher impact than **single-use PP carpet** due to their weight; however, they are designed to be used for 10+ years, which spreads the impact over a longer timeframe

Using circularity to reduce footprint

- **Extending the lifetime** of products is the most effective way to reduce the lifecycle impact of the material. **Single-use products should be eliminated** wherever possible.
- **Using products with recycled content** can also significantly reduce the raw material impact, especially for single-use products.
- End-of-life management of material can be difficult to navigate, especially if end-of-life solutions need to be found under time pressure. **End-of-life planning needs to be considered as early as possible (ideally during conception or design).**
- In most cases reviewed, **transport** and **end-of-life** stages have a lower contribution to the overall lifecycle impacts than **raw materials' extraction** and **manufacturing** stages.

Managing plastics

- Plastics have become a hot topic in consumer-facing products over the last two years, with several sectors making a push to reduce or eliminate plastics use.
- Despite being manufactured from fossil resources, plastics often have a better overall environmental impact than other materials, partially due to their **light weight and functionality.**
- **End-of-life management of plastics remains a huge issue, with a lack of recycling capacity globally** to address the volume of plastic waste produced.
- Understanding the different materials and end-of-life options available is key to managing plastics more effectively and reducing reliance on landfill and incineration. **This report provides detailed guidance on end-of-life options for the main types of plastic materials.**

KEY OBSERVATIONS – MATERIAL-SPECIFIC INSIGHTS

Metals

- Metals are coming back into popularity, partially due to their recyclability at end-of-life.
- Due to their durability and large manufacturing footprint, it is recommended that metals are only used in multi-use applications.
- Most steel and aluminium products include some recycled content, which lowers their footprint. However, recycled content often varies depending on the manufacturing source as well as other factors (such as market prices of metal ores), and **very few metal products are sold with indications of their recycled content**.
- We recommend that further environmental data, either **EPDs* or LCA** studies**, are obtained for specific metal products due to the variability in manufacturing impact.
- **Aluminium composite material** requires specialist recycling equipment and may not be processed by many metal scrap operators.

Timber

- **Structural timber has a much higher CO_2 footprint than expected**, predominantly due to the **emissions from kiln-drying**. This may vary significantly with different kiln drying technologies.
- We recommend that **product-specific LCAs**** are obtained if using timber products as there is significant variability is processing impact, as well as material sourcing. Additionally, it is recommended that timber is sourced from **sustainably managed forests, backed by certification**.
- We have not taken carbon sequestration into account here as the lifetime of the product is not guaranteed.
- **Avoiding incineration and landfill** are recommended to achieve full carbon benefits. Timber is durable and may be reused or repurposed in many different ways.

PVC vs non-PVC alternatives

- From a **climate and water perspective**, PVC and non-PVC materials tend to have **similar impacts**
- However, **moving away from PVC does have environmental benefits** which are not reflected in the results including **reduced human health risks from PVC additives.**
- **Banners** are one of the main areas for PVC usage. These are **challenging to recycle due to their multimaterial construction** (usually PVC coating a PET textile layer). **Non-PVC banners face the same recycling challenges** as these tend to have the same construction with just the PVC replaced.
- Although incineration is not a recommended end-of-life route, **incineration of non-PVC banners is safer than incineration of PVC banners.**

***** EPD: Environmental Product Declaration
******LCA: Life Cycle Assessment

KEY OBSERVATIONS – INNOVATIVE & BIO-BASED MATERIALS

Innovative product	Analysis	Recommendations
Polypropylene board with seaweed-based filler	Production of seaweed derivative may have significant water footprint, while the carbon impact does not differ greatly from a recycled PP board.	Obtain further environmental information from suppliers if considering using this product as impact may change depending on processes used.
Bamboo board	Bamboo has a slightly higher impact than standard plywood; however, this will depend heavily on the bamboo source	Like all wood-based products, bamboo's impact may vary, and obtaining further environmental data on specific products is recommended to aid decision making.
Fibreboard from agricultural waste	Waste-based fibreboard has a much lower material and manufacturing impact than products based on virgin materials; however, products need to be used long-term to maximise carbon sequestration benefits.	Impact may vary with processes used for compacting board and for different resin types – this should be confirmed with the supplier. Reuse is recommended, and landfill and incineration should be avoided if possible.
Non-PVC banners	Non-PVC banners have similar carbon and water impacts as PVC, but pose fewer human health risks. Even for non-PVC banners, true recycling remains uncommon.	While using non-PVC alternatives may not have a huge impact on carbon footprint reduction, continuing a shift away from PVC is recommended. Recyclability claims should be challenged.
Hemp fabric textiles	Hemp fabric may have a higher environmental impact than recycled PET textile due to its weight and processing of the material.	Obtain further environmental information from suppliers as impact of hemp may vary depending on crop growth and processing.
Paper-based floor covering	Paper-based flooring may have significant advantages over carpet, especially for single-use.	Obtain further environmental information from suppliers – different flame retardant additives may have different impacts.

Biobased alternative materials

- **Biobased materials can be environmentally beneficial, but impacts need to be weighed up**. For biomaterials made from **purpose-grown crops**, other aspects such as **land-use** and **biodiversity** need to be reviewed.
- Materials from **bio-wastes** or **recycled biomass (e.g. paper)** can have **significantly lower impacts**
- **Water footprint** can be significant for crop growth. This becomes more critical in water-stressed areas.
- Although biomass-based materials may act as a CO_2 sink, we have not included this in the footprint as the end-of-life of the product is not guaranteed. Incineration of products releases CO_2 while landfilling them may generate significant quantities of methane.
- **We recommend that further data beyond this report is obtained for all biobased products, preferably comprehensive, 3rd-party verified LCA.**