



Strategies for Reducing the
Carbon Impact of Temporary
and Touring Exhibitions in the
Museums and Galleries sector
*Future Observatory Cultural
Policy Fellowship Report*

AUTHOR URGE Collective



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Abstract



This report investigates current and future strategies for minimising the carbon impact of the design and build of temporary and touring exhibitions in the UK museums and galleries sector.

IT EXAMINES:

- Current museum and stakeholder working practices
- Significant challenges to carbon reduction
- The use of Carbon Calculators
- The potential for sector-wide initiatives and guidance

KEY AIMS:

- Identify the significant barriers to reducing the carbon impact of temporary and touring exhibitions
- Suggest tools and strategies to overcome those barriers
- Recommend opportunities for future research and development

METHODOLOGY:

This report draws on the following sources:

Pilot Project: In 2021, the Design Museum invited URGE Collective to collaborate on its *Waste Age: What Can Design Do?* exhibition. This project had two outputs: URGE conducted an Environmental Audit of the exhibition, using LCA methodology. Through this process URGE observed and advised the Design Museum team as well as the exhibition's 2D and 3D designers on the design and build of the exhibition and how to reduce the carbon impact through material and production choices.

Data gathered via the audit was used to inform an Impact Model carbon calculator on Excel developed by URGE for the exhibition. The Impact Model enabled URGE to calculate the exhibition's carbon footprint, as well as to provide the Museum with benchmarking data and best practice insights for future exhibitions.

Further development: In 2022, building on the environmental audit of *Waste Age*, the Design Museum commissioned URGE to develop a Guide to reducing the environmental impact of exhibitions and a Beta version of the Impact Model. Both were made available to the sector for feedback.

Workshop: In March 2023, the Design Museum hosted an Environmental Impact Workshop in order to share the Guide and Impact Model with the wider museum sector and stakeholders. Attendees were asked to provide feedback on the Guide and Model as well as comment on their own practice and challenges in this area. Workshop summary.

Stakeholder interviews and further feedback: Following the workshop, URGE and the Design Museum conducted a series of interviews with key stakeholders in order to garner more feedback on the Guide and Impact Model and significant barriers to the sector reducing its carbon impact. Further feedback on the Impact Model was also gathered from stakeholders via email and an online survey but its reach was limited due to the timeframe of this report.

Analysis: URGE conducted comparative analysis of the carbon calculator tools in use by the museums sector

The key recommendations provided by this report are the result of the synthesis of the above activity combined with a review of its findings with the Design Museum team.

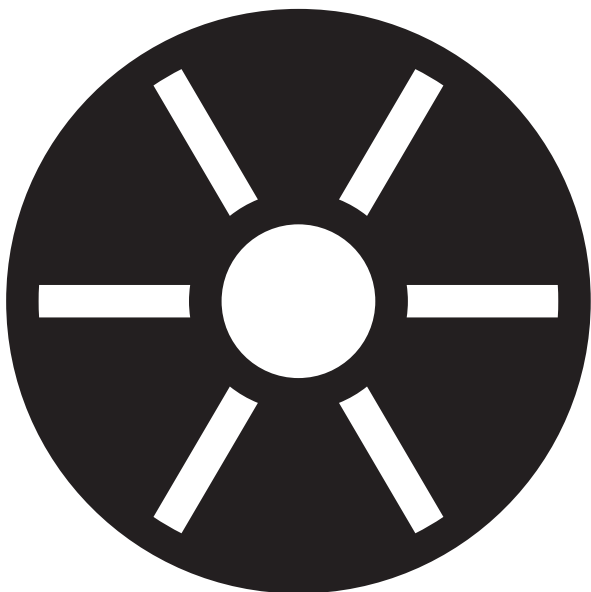
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Executive Summary

Key Insights and Recommendations



BUILDING INSTITUTIONAL KNOWLEDGE AND EMBEDDING MORE SUSTAINABLE THINKING IN THE DEVELOPMENT PROCESSES

Reducing the carbon impact of the design and build of temporary and touring exhibitions relies on measures taken at both the institutional level but also in the specific activity of planning, curating, designing and building exhibitions themselves. The URGE Collective's [Environmental Audit of the Design Museum's Waste Age exhibition](#) revealed that the single greatest factor in minimising its impact was tDM's use of energy from renewable sources in the gallery space. The second biggest factor was the curatorial decision to include one major exhibit in the show which had to be transported from overseas.

The Design Museum's guide to reducing the environmental impact of exhibitions sets out the role of each level of museum management in contributing to the reduction of the impact of exhibitions. Its intention is not only to influence material choice, but also to drive organisational change. This begins with the public acknowledgement of the Climate Crisis and the subsequent setting of policies and targets by the institution as a whole, as done by the Natural History Museum as part of its [Sustainable by Nature](#) plan.

However, our research revealed barriers in the translation of such goals into tangible actions when planning, designing and building exhibitions, and specifically [barriers linked to measuring the carbon impact of exhibitions](#). The [advice in the Guide](#) seeks to address this by setting out a process for minimising impact to run alongside the design and procurement process already used by the Design Museum, as a model for others.

Those present at the [workshop](#) stressed the need for environmental goals to be understood and embedded across the organisation, with senior leadership commitment. Comparison was made with D&I training - could a similar approach for environmental action be put into practice, perhaps with the support of the Museums Association or other body? There was also a call for this area of work to be written into job descriptions and KPIs.

INCLUDE ENVIRONMENTAL IMPACT DATA WHEN COMMISSIONING AND COLLABORATING WITH DESIGNERS AND CONTRACTORS

Our research revealed that the scheduling of temporary exhibitions by museums mitigates against the adoption of some carbon-reducing practices, such as re-using materials from exhibition to exhibition. As recommended by the [Bio27 guide](#), fewer exhibitions, running for longer periods can reduce overall impact and facilitate the re-use of materials.

Although environmental impact criteria are being introduced to tendering documents for both designers and contractors working on exhibitions, further development is needed. The [Design Museum Guide](#) includes [detailed advice](#) for working with designers and contractors in order to



enable lower carbon impact exhibitions. The adoption of a standardised tendering document for designers and contractors across the museums sector would help consolidate best practice, align criteria for assessing contractors and help contractors themselves to ensure they have appropriate data and policies in place.

Our recommendation is to develop the Design Museum Environmental Impact Toolkit along with a suite of standardised documents and check-lists so that it could be adopted for use by the sector as a whole, allowing for customisation to suit individual institutions.

A STANDARD CARBON CALCULATOR FOR THE SECTOR TO AID DECISION-MAKING

Various Carbon Calculator tools are in use across the sector ([see analysis](#)). To date, many of these have been developed principally for the purposes of recording and auditing carbon impact rather than aiding decision-making during the design and build phase. The most-widely adopted tools, such as those from Julie's Bicycle and the Gallery Climate Coalition, do not focus specifically on material use in exhibition design. The Impact Tool

developed by URGE Collective for the Design Museum is intended for use by the exhibition, curatorial and project management teams to help make decisions during the exhibition development and production process. The Model enables the measurement of an exhibition's carbon footprint across the following areas: Project Development, Object Transport, Build/ Setworks, Reused Resources, Museum Operations, Waste, Touring. Our research revealed widespread appetite for a standardised tool which could be used across the sector, by institutions, contractors and designers alike.

"[We would] use this as a planning tool rather than for post-exhibition carbon measurement. We are in the process of getting carbon accounting software which will measure all emissions across our estate and operations, so then we can look at how exhibitions fit within our total emissions. However, for organisations who aren't doing this, the tool is a good way to put a very thorough measure on carbon impacts for an exhibition. Our long-term strategy is to move towards carbon budgets for exhibitions and this tool could help shape the decision-making process, therefore it could be useful in Design and Build as a comparative set of information on Carbon cost that would be equivalent to QS stage cost estimates or as an overall exhibition planner. To use the tool as a planning tool, it needs to be easy to use as it would be used by non-specialists. It's vital that there is a tool to inform key decisions around loans and materials etc." **MELISSA PAINTER HEAD OF SUSTAINABILITY, V&A**

"There is a real need for a standardised tracker to measure impacts of exhibitions, so it is great to see this developing." **GRACIELA MELITSKO THORNTON, CREATIVE GREEN PROGRAMME LEAD, JULIE'S BICYCLE**

The Impact Model is currently a Google Drive Excel-based tool in beta version. URGE are trialling an updated version of the Impact Model on the design and build of two permanent galleries at the new V&A East Museum. To maximise adoption across the sector, it is recommended that funding is sought for the development of a standardised tool for exhibition design and build on a SASS or app model, potentially in collaboration with another provider in the sector. See feedback on Impact Model received via sector workshop that would inform a standardised tool. Ideally, this tool would integrate with both 2D and 3D design software e.g. Adobe Creative Cloud or 3D vector programme to empower decision-making and embed its use in the design process. It would prioritise ease of use in order to maximise adoption by resource-poor museums. If supported by the sector as a whole, this would help allay fears that the tool would not be supported or updated on an on-going, long-term basis. See interview with Bizot Group's Anaïs Aguerre.

RESEARCH FEASIBILITY FOR ALBERT-STYLE CERTIFICATION

If a standardised carbon calculator was to be adopted by the museums and galleries sector collectively, it could enable the introduction of a standard or certification scheme similar to that pioneered by BAFTA via the Albert Sustainable Certification Production scheme. Our research revealed considerable support for such a scheme in the Museums and



Galleries sector.

SETTING CARBON BUDGETS ALONGSIDE FINANCIAL BUDGETS

Setting a Carbon Budget, to run concurrently with the financial budget, either on an annual basis and/or for each exhibition can aid decision-making and empower exhibitions teams to overcome objections from internal and external stakeholders, including design teams, artists, suppliers and contractors. Access to a standardised carbon calculator which can provide appropriate data, specific to the exhibition, during the planning, design and build process is vital. Carbon Impact can then form part of the curatorial decision-making process: for large objects that require transportation from overseas, as in the Waste Age example, the question can be asked, “Is it worth the carbon?”

CONSIDER TOURING AT EVERY STAGE

Touring Exhibitions departments must be involved in decision-making and incentivised to reduce carbon impact. Whether or not an exhibition will tour, has consequences for the choice of materials and should be integrated into the design process via decision trees, RAGS, and carbon tracking tools, as explained in the [the Design Museum Guide](#). Touring is typically seen as part of the commercial arm of a museum. As a result, Touring departments may operate to KPIs such as Reach & Reputation (how many venues hire an exhibition, how many countries it tours to, how many visitors see exhibitions) and Revenue (financial income from hire fees) but not Environmental Impact.

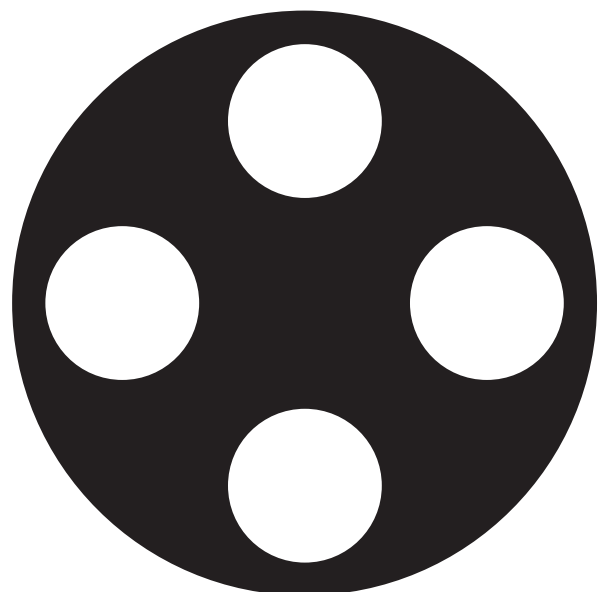
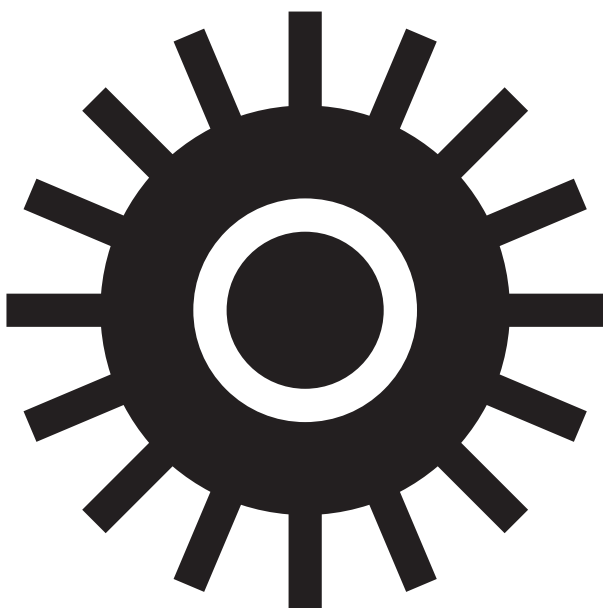
RESEARCH A SYSTEM FOR RE-USING EXHIBITION ASSETS AND MATERIAL

As noted in our interview, [BARDER](#) has expressed an interest in piloting a version of its platform in the UK. This could run via the [South Ken ZEN+](#) group of 22 cultural institutions in the South Kensington area of London which is working on “a systemic model of how the UK’s densest museum quarter will work to reduce emissions and waste and increase biodiversity and green spaces”.

A pilot project would inform the ability to create a functional reuse system for the sector, with the aim to: substantially reduce the waste produced from exhibitions; reduce the carbon emissions associated with constructing exhibitions from purely raw materials; build a sharing network and community amongst cultural organisations, and develop a value mechanism to maintain a reuse system.

3

Challenges in creating a 'sustainable' temporary or touring exhibition



“Everything we have achieved has been in spite of our institutional structure” **COMMENT AT MUSEUMS SECTOR WORKSHOP**

INSTITUTIONAL KNOWLEDGE AND COMMITMENT

A lack of interest in, knowledge of and commitment to more sustainable practices throughout organisations was raised as a major barrier to reducing the carbon impact of exhibitions in our research. One workshop attendee spoke of a “fundamental lack of understanding of the trade-offs, and value judgements needed and how we make them... when we reach a key gateway decision point, how will we come down on the side of the planet?” Across the sector, interest in and commitment to sustainable goals is very varied. Some, such as the Natural History Museum, have declared a Climate Emergency and committed to targets. Others have barely begun to respond to the Climate Crisis at an institutional level even if individual staff are pushing for action. Anaïs Aguerre of the Bizot Group has noted a wide variance in appetite for addressing climate-related challenges among museums internationally, reflecting local culture. It is beyond the scope of this research to assess whether there are such regional variations in the UK or by size of museum.

Understandably, museums have tended to focus on their energy use and transport as these two factors are the biggest contributors to their carbon footprint. The work of Julie’s Bicycle has been instrumental in driving awareness and action on these issues. However, reducing the impact of the design and build of exhibitions requires specific policies, processes and tools as highlighted via our environmental audit of Waste Age.

MUSEUM-STANDARD ENVIRONMENTAL CONDITIONS FOR THE DISPLAY OF OBJECTS

In its discussions with members leading up to the adoption of the Bizot Green Protocol in 2014, the Bizot Group of major museums believed that the biggest contributor to exhibition carbon impact was the museum-standard environmental conditions for the display of objects. These standards require museums to maintain galleries at precise levels of temperature and humidity, requiring significant energy use and restricting options when it comes to the design and build of temporary exhibitions.

The Bizot Group has recommended that “Museums should review policy and practice, particularly regarding loan requirements, storage and display conditions, and building design and air conditioning systems, with a view to reducing carbon footprints. Museums need to find ways to reconcile the desirability of long-term preservation of collections with the need to reduce energy use.” [Read Museums and the Climate Crisis](#). The Bizot Group is currently conducting further research into agreeing more flexible standards that could reduce energy use. [See Bizot Group interview](#).



TOURING CONSIDERATIONS

Touring is usually seen as a profit centre at museums. Typical KPIs concern reach and the number of third party institutions taking an exhibition. Sustainability is seldom included as a KPI.

Feedback from one Workshop attendee: “[At my museum] the Touring Exhibitions department is a separate entity to the main programme (although our activities intertwine and we work collaboratively of course). We are part of the commercial arm of the museum (our partner venues pay a fee to hire the exhibitions, providing revenue). The performance of our department (Touring Exhibitions) is measured on Reach & Reputation (how many venues hire our exhibition, how many countries we tour to, how many visitors see our exhibitions, etc) and Revenue (financial income from hire fees). Being sustainable is not a Key Performance Indicator (KPI) that Senior Management refers to when assessing our success. So at the moment, it is down to individual staff members and team managers who try to reduce the carbon footprint by choosing greener materials or alter processes where possible, but if these options increase our production costs (and reduce our income), then it won’t always make sense for us to choose this route. If we were incentivised by Senior Management to reduce

our Carbon footprint (e.g. including CO2 impact reduction in our KPIs) maybe that would help make a difference in the long term.”

If it is anticipated that an exhibition is going to tour, this will impact materials used for the construction of display items i.e. materials may need to be more robust, longer-lasting and suitable for packing and repacking. The Design Museum Guide builds this into the decision-making process via a decision tree to determine a strategy aligned to specific material RAGs. The consequences of touring also need to be built into any carbon calculator used. For example, feedback received from the workshop on the Design Museum Impact Model asked that “the transport section should include some sub-journeys for when the exhibition goes from Point A to B, as it may use several transport modes. E.g. going from London to a museum in France would possibly include the collection from London to Heathrow (Road) + Heathrow to Paris Charles de Gaulle (Air) + delivery from CDG to museum (Road).”

SCHEDULING, BUDGETS, PROCUREMENT AND CONTRACTS

Museum operating models typically prioritise a fast turnaround of multiple shows per year. Often, each exhibition has its own budget, procurement process and contracting (see [Factory Settings interview](#)): Current museum ways of working make it difficult to recognise the financial value of reusing materials from one exhibition to the next, even with contractor framework agreements in place. Most temporary exhibitions have their own individual budget. There is often no mechanism for spreading the cost of a material that can be reused across multiple shows. Often, museum procurement rules require each exhibition to go out to tender separately. Some national museums have framework agreements which allow contractors to bid on, and win a contract for multiple shows across, for example, a year. This potentially allows contractors to use materials more efficiently and plan for re-use but anecdotal research suggests there can be a lack of joined up planning between project teams which still makes it difficult to develop the exhibition design to enable reuse of temporary walls between projects. Factory Settings cited the example of a prominent auction house which commissioned a set of movable walls 15 years ago that are still in use today.

Comment from Museum Head of Design at the March Workshop: “The key things we will judge a contractor on are, a) money and, b) getting it built on time. And yes, we’ll ask what their waste management plan is but at no point in that process are they incentivised to reduce their carbon impact. And, actually, we specifically ask contractors to ‘leave no trace’ when the exhibition ends, so there is no plan to retain anything. In fact, we are structured in a way that incentivizes single-use structures, because we’re not going to ‘back to back’ with exhibitions.”

RE-USE OF MATERIALS

Fire regulations, health and safety and liability issues all mitigate against the re-use of materials, whether in a subsequent exhibition or by a third

ELIMINATE THE PACKAGING WE DON'T NEED

DESIGN PACKAGING FOR REUSE

CIRCULATE ALL PACKAGING TO KEEP IT IN THE ECONOMY AND OUT OF THE ENVIRONMENT

What plastic packaging
can we stop using?



How can we reuse
packaging at home?



How can we refill
on the go?

How can we make sure all plastic
packaging is recycled?



Is compostable packaging
the solution?



UNIVERSITY OF
SHEFFIELD

How can we innovate to eliminate
unnecessary packaging?



How can we return reusable
packaging from home?



How can we return reusable
packaging on the go?



Swap plastic to
other materials?



party. (See [Factory Settings](#) interview for more detail). A scheme for museums to share assets or make them available to other institutions for re-use has been discussed within the sector, both from a sustainability standpoint and as a cost-saving measure. The main barriers to such a system are storage (most museums do not have any space to store spare assets such as plinths), responsibility and liability (assets need to be rated for loads, guaranteed fire safe for use etc), and transport. In New York, [BARDER](#) operates a platform to facilitate the sharing of assets which is used by many major museums. Participants organise their own transport and items are offered for a limited time, thus avoiding the need for lengthy storage.

TENDERING

Tenders score applicants on a variety of factors, with a different weighting applied to each. The biggest weighting is typically given to cost, but the relative weighting of environmental credentials is increasing, [Factory Settings](#) believed. There is still considerable variation in this weighting, with [Factory Settings](#) reporting that anything from 5% to 20% is awarded to this area. Cost is still the deciding factor, which presents a real challenge as alternative, more sustainable materials can often be considerably more expensive.

The [Design Museum Guide](#) makes recommendations regarding tendering – see commissioning design chapter from p20.

RELIABLE DATA

From the [Workshop](#): Access to the data on materials from contractors can be very challenging. From the [Design Museum](#) team: “Given compressed delivery timelines and availability of contractors, the focus for the project teams will always be on completing the exhibition build and fit out to a high standard on time and on budget. After a contractor has left site, they often move on swiftly to the next project and don’t have the bandwidth to provide additional data to the client”. Some attendees cast doubt on the reliability of carbon data supplied by contractors.

In their interview, [Factory Settings](#) also raised the issue of reliable data, particularly in regard to steel suppliers.

From the [Design Museum](#) team: “We depend heavily on answers from contractors and lenders who might not be forthcoming as it is not a priority to share details with us when they are busy with other projects.”

COST

Cost is a significant barrier to using more sustainable materials or methods. The vast majority of respondents stated that cost factors overrode every other consideration when it came to making choices on their exhibitions. Similarly, [Factory Settings](#) reported that specifying sustainable



alternatives can raise costs by multiple factors.

From the Design Museum team: “It’s hard to compare like-for-like costs for using more sustainable materials, especially as contractors are unlikely to want to go to the expense of providing two sets of quotes. We need to keep in mind that the Waste Age exhibition happened during Covid when there were issues with supply chain/transport. Projects in 2023, in turn, are more expensive because of inflation, higher energy costs, and higher staff wages.

“Generally speaking, the most common, widely available, sustainable vs less sustainable raw materials are similar in price. The difference is the fact that when contractors buy sustainable materials that are less frequently used in other projects, they don’t order large quantities and that makes it more expensive for the client. Moreover, if it’s an unusual/new sustainable material that they have never used before, it will take them more time and resources to understand how to use it, which makes it more expensive for the client.

“We should also remember that there is a certain quality of finish expected by museums which can require more time and resources to achieve.”

It was suggested that a solution could be to borrow a practice from the construction industry – that contractors could band together in order to purchase materials at lower prices and to meet minimum order quantities. However, Factory Settings believed that this might fall foul of procurement rules at some institutions ([see interview](#)).

TOOLS AND RESOURCE

Respondents cited a lack of time, skills and confidence to use existing carbon calculator tools at the level of exhibition teams. Using these tools requires a certain level of data analyst skills within organisational teams and, inevitably, places additional burden on already time-poor staff. Some tools are not very user-friendly. A balance must be struck between the level of detail required to produce useful, credible data and the UX needed in order to encourage use by non-specialists in particular.

As [Anaïs Aguerre](#): pointed out, staff reductions have led to increased workloads for many in exhibitions teams. Not only do museums need to allocate resources to measuring and reducing their carbon footprint, but the developers of the tools to assist this need to bear in mind the limited time that users have to work with them.

More research is needed to understand the impact of using carbon calculators on staff time.

Anaïs also stated that her members needed reassurance that any carbon calculator adopted as an industry standard will be funded, supported and developed in the future. They need to know that it will be continually upgraded and maintained: that it will still exist in years to come so that time spent on training and learning the tool will not be wasted and that it will be possible to produce comparative data using a single methodology.

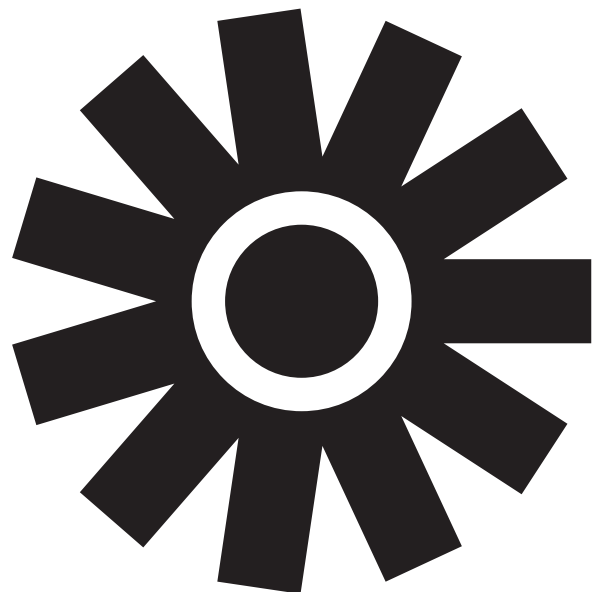
She compared the current situation with carbon calculators and the possible introduction of carbon budgets to the early days of museums experimenting with digital technology. “A lot of museums were creating their own bespoke digital environments. The result was that those environments couldn’t really speak to one another, which limited the ability of museums to work and collaborate in that sphere... I think what we need for these things to be meaningful, is to have standards that are universal, otherwise, everyone is going to measure things [in their own way] and this information will be meaningless in the context of a cultural organisation working in an international context.”

From the Design Museum team: “We are using these tools if we have a doubt about certain materials or concerns about an object travelling. If we’re deciding between two options it can help clarify the best approach. These tools have catalysed a culture shift. Whereas before decisions would be mainly focused on financial budget, we are now considering the environmental impact of choices – e.g. shipping a work from Australia.”

4

Waste Age Case Study

*Calculating the environmental impact of an exhibition
examining how designers are tackling the issue of waste.*





“People often have beliefs about sustainability which the data will show to not be true. We’re trying to help designers use this data in their work.” **SOPHIE THOMAS, URGE**

MEASURING

The environmental audit was based on a Life Cycle Analysis (LCA) approach. URGE worked with the museum’s curatorial, design, facilities and production teams to understand the environmental impact of the building and the exhibition design, and to guide design decisions that would reduce the exhibition’s impact.

URGE created an Impact Model to monitor the three life cycle stages – pre-exhibition, live exhibition, and post-exhibition – and to highlight the technical source of impacts. These include the manufacture of materials, renewability of energy sources and the weight and origin of exhibits. Beyond these were non-technical levers that can be controlled or influenced by the Museum, such as brief criteria and travel recommendations.

The Impact Model was informed by stakeholder interviews, desk research, design reviews, observation of the production process, email trackers, a review of the Museum's facilities procurement, resource consumption and waste generation, and an extensive data gathering exercise. This process enabled a detailed data inventory relating to transport, energy, collateral, exhibits, commissions, and more to give a fuller picture of the impact of the Waste Age exhibition.

"The interviews, design reviews and conversations provided a learning experience that helped everyone involved understand how choices they make could have knock-on effects," Alexie Sommer, URGE.

From the Design Museum Head of Facilities: "Despite being a 1960s construction, the refurbishment for the Museum's occupation in 2016 means that most building services are relatively new and efficient. As such sustainability improvements need to be more nuanced. The museum uses 100% renewable REGO backed electricity but to further this we invested in a battery system onsite which stabilises our draw from the national grid, reducing supply chain emissions as well as optimising the electricity consumed onsite. Our heating is provided as a part of a district system, and we seek to optimise HVAC and lighting settings and timings across the estate."

[The Waste Age Impact Model Audit can be viewed here](#)

DEVELOPING

URGE supported Waste Age's 2D designers – SPIN – to reduce the impact of their digital carbon, and their print outputs: for example, by using a print gun for signage rather than single-use vinyl. URGE also worked closely with the exhibition's 3D designers – Material Cultures – to develop lower-impact structures for the exhibition, using these key approaches:

- reusing elements of previous exhibitions: a central wall and plinths from the previous exhibition were repurposed for Waste Age
- constructing rooms from biodegradable materials: wool, locally sourced clay, and cross-laminated timber also have low embodied carbon
- designing structures to be deconstructed and fully reused: a wall of unfired Adobe bricks with no fittings was designed to be disassembled and returned for reuse

"We were interested in bringing sustainable practices into a design sector which usually builds wasteful temporary spaces without thinking about disassembly or the life cycle of materials." **GEORGE MASSOUD, MATERIAL CULTURES**

KNOWLEDGE SHARING

By analysing data in the Impact Model, URGE produced a pre-exhibition audit summary, measured in tons of CO₂e, which was exhibited within the exhibition, and published on the Museum's website. This enabled



the Design Museum to understand and communicate the environmental impact of the exhibition clearly, engaging designers, museum staff, partners and visitors in discussions to find the solutions in reducing energy, waste and associated impacts. By sharing the findings and learnings, URGE and the Design Museum hope to help other organisations and designers challenge and transform their practices.

“We’re here to build a model. Our work can’t end up on the shelf – the audit is just the beginning.” **RALF WATERFIELD, URGE**

KEY FINDINGS

TOTAL EXHIBITION IMPACT: approximately 28 tons CO₂e – 30% of which was in the build and 50% was in a large-scale installation shipped from Ghana.

BUILDING ENERGY:

→ Energy supply is the most important step to reducing emissions. If the Design Museum used the national average electricity, the impact of the exhibition would have been about 185 tons CO₂e. The museum’s use of renewable energy cut the total impact by about 85%.



EXHIBITS:

- The objects weighed roughly 2.5 tonnes, with the aforementioned large-scale installation alone accounting for 2 tonnes, and the average distance they travelled was roughly 1,2500km (many were from London) thus the logistics footprint, excluding the installation, was less than 20kg CO₂e (or 0.06% of the total footprint). The installation added another 5 tonnes CO₂e to the count.

EXHIBITION BUILD:

- The highest single impact in the construction came from the screws which held the reusable cassette system together. Using 4,800 standard stainless steel decking screws had an impact of 1.9 tons CO₂e – roughly 7% of the total exhibition footprint.
- Using a timber frame system over a standard aluminium exhibition frame system saved 1.5 tons CO₂e, reducing the impact by about two thirds.
- Using unfired bricks instead of fired bricks saved 6 tons CO₂e, the second most significant saving after switching to renewable electricity.

REUSE OF EXISTING MATERIALS/BUILD:

- Partition wall from a Stanley Kubrick 2019 exhibition.
- Silicate bricks from a previous exhibition dedicated to Charlotte Perriand in 2021.

DESIGN DECISIONS ABOUT WASTE:

- Floor not covered.
- Print gun used instead of vinyl for graphics (from a waste concern rather than carbon impact).

DIGITAL COMMUNICATION:

- Up to 3% of the total footprint was associated with digital communication
- Emails: approximately 11,000 emails and 11GB of data were shared, which equates to around 1 ton CO₂e.
- Video calls: approximately 750 person hours were spent on video calls. The impact of this was less than 0.15% of the total footprint.

RE-USE POST-EXHIBITION:

The second life of materials was key to keeping Waste Age's carbon footprint low. The Design Museum managed to secure new homes for the majority of the exhibition elements:

- All wood wool and timber donated to a local construction company.
- 800 fired bricks donated to a local construction company.
- Perspex cases: most will tour with the exhibition to Paris, some given to Royal College of Art students.
- 250 fired bricks, 10 silicate blocks and 10 adobe bricks donated to a local designer.
- All felt donated to a London-based fashion designer for a collection.



LEARNING FOR THE NEXT EXHIBITION

The environmental audit enabled the Design Museum to have a deeper understanding of the impact of one of their exhibitions. The team involved are now incorporating guidance and applying key learnings to improve internal and external processes so that the next exhibition can have a lower environmental impact. If all museums, heritage and cultural organisations conducted the same process, the impact would be exponential.

KEY PRIORITIES FOR A LOW IMPACT EXHIBITION:

- Use renewable energy for electricity supply for all aspects of exhibition production
- Include environmental impact criteria as a non-negotiable in all exhibition briefs
- Ensure post-life of exhibition structures and content is determined pre-build and design for reuse, and recovery (no glue or lamination etc) from the beginning. Consider wider network and rental options
- Select low impact construction materials for the build and think

- adaptable, flexible and reusable.
- Commission exhibited objects using low impact materials and production methods
 - Communicate impact of exhibition to visitors to encourage positive behaviour change
 - Limit flying and travelling during the curation and installation/decant process to essential travel only

5

Design Museum Guide and Impact Model



The Design Museum: “As an institution, it is important that we take up the challenge in our own work, which is why we invited URGE Collective to continue the collaboration that began on our Waste Age exhibition and help us to create this guide to designing exhibitions in a more sustainable way. While the guide is based on our work at the Design Museum, we hope that it offers some core principles that are useful to other institutions and enables them to reflect on their own working processes. Of course, we recognise that exhibition-making is only one of the ways in which museums create emissions.”

The [Design Guide](#) can be downloaded via [this link](#).

The [Impact Model](#) is currently a Google Drive Excel-based tool, in beta version, to help calculate the estimated carbon footprint for an exhibition. Developed by URGE and informed by the exhibition design, build and development process utilised by the Design Museum. It is intended for use by exhibition, curatorial and project management teams to help make decisions during the exhibition development and production process.

The Impact Model is where the museum should capture (directly, or linked) all impact related data and information. The model enables the measurement of an exhibition’s carbon footprint across the following stages:

- Project Development
- Object Transport
- Build / Setworks
- Reused Resources
- Museum Operations
- Waste
- Touring

Collating all inputs is intended to fall under the responsibility of the Exhibition Project Team, led by the Exhibition Project Manager with support from the Exhibition Coordinator and Exhibition Curator, Assistant Curator and Facilities colleagues, who are all encouraged to treat the tool as a dynamic resource throughout the exhibition lifecycle. The inputs would start with a record of all anticipated elements and their estimated quantities which should be provided by contractors and lenders (i.e. tonnes of timber) across the above stages. Once the procurement has been completed, this information should be updated along with defining their qualities (i.e. virgin, recycled, reused, etc). In particular the ‘Touring’ stage should be treated as an ongoing task to measure an exhibition’s total carbon footprint beyond its residency at the museum.

While developing a tour, the museum team would consider how necessary couriers are to oversee installation, modes of transport for objects and people and how existing build elements can be substituted for locally available alternatives to avoid shipping. A more detailed user guide is included in the tool.



On the summary page, the tool includes an evaluation of how complete the carbon assessment is in the context of all resource requirements for an exhibition. This is expressed as a percentage in terms of a minimum benchmark as well as a stretch target, which would reflect best-in-class reporting quality.

The model's design is deliberate so that it can, and should, be used by other museums, galleries, events and exhibition spaces. It is open-source and capable of being continuously refined and expanded.

IMPACT MODEL SECTOR FEEDBACK SUMMARY AND RECOMMENDATIONS

Via the in-person workshop and an online survey, URGE Collective and the Design Museum invited feedback on the Impact Model. At the time of writing, that feedback process is ongoing but below is a summary of responses so far with URGE recommendations.

SCOPE

The feedback shows that beyond the 2D and 3D designers, AV and lighting contractors also seek to better understand their contributions to an exhibition's footprint. This is being tested already on a different project URGE is currently working on with the V&A. Additionally, there is an appetite to use this tool to set (and monitor) carbon budgets.

URGE recommends developing the operational impact assessment element of the tool to capture detailed equipment inventories and schedules required for each exhibition. This would move the model from a low-fidelity top-down method to a more high-fidelity bottom-up method, and therefore more accurately represent the exhibition's specific emissions related to AV and lighting hardware, rather than including facility overheads, which should be captured by the institution's GHG accounts. Further, the tool would become much more useful to guide the decision-making process regarding AV and lighting equipment rather than reporting their impact 'after the fact' as it currently does. This is specifically relevant for institutions that aren't supplied with renewable electricity.

UX

The feedback indicates a strong demand to make several aspects of the tool more flexible to accommodate the specific conditions of different institutions, such as multiple exhibition spaces. Flexibility is also required for the tool's structure and layout to allow the user to add/remove elements as needed.

Additionally, the feedback points towards a need to provide more clarification and 'in-situ' guidance on some of the available options (i.e. transport or commuting by bicycle is considered zero emission and should currently be labelled as 'no transport needed').

URGE recommends revising any tDM-specific elements of the tool to enable bespoke inputs and to include explanatory prompts or section-



specific guidance where appropriate. Additional section-specific content should focus on providing real-time feedback on current impacts and potential options to achieve reductions (this could be as simple as a standardised ‘what could you do’ list). The aforementioned carbon budget could be built into this type of dynamic feedback feature.

DATA

The feedback indicates that the BEIS dataset is not sufficiently detailed to reflect the materials currently used in the sector. Therefore, the decision-making capability of the tool is limited. There is a need for a wider range of sector-specific material options and for organising these in an intuitive and logical way. The necessary depth of supply chain measurements needs to be clarified/defined.

URGE recommends expanding the tool’s underlying dataset in one of the two following ways:

- 1 Obtain a licence for ecoInvent and essentially replicate the STITCH carbon calculator within the Objects and Built sections of the tool, including a material categories hierarchy. This would, to a certain

- extent, mitigate the need for the user to research a material's supply chain history and manufacturing specifics
- 2 Allow users to add materials to the database via a robust process. This process must guarantee that the submitted information is
 - A obtained from a reliable source,
 - B complete (enough) to present the material's carbon intensity (including place and type of manufacture to accurately measure supply emissions), and
 - C verified/validated

Further, URGE recommends that the tool automatically identifies at least one option of more favourable materials to the user, so the selection process of preferred options becomes less time-consuming. This feature would need to consider the specific functional requirements of a material or component to be reliable (i.e. load-bearing capacity).

ANALYSIS OF CARBON CALCULATORS IN USE BY MUSEUM SECTOR

URGE Collective has conducted comparative analysis of the most commonly-used carbon calculators used by the UK museums sector. [The analysis is presented here.](#)

FURTHER COMMENTARY ON THE TOOLS FROM URGE COLLECTIVE'S RALF WATERFIELD:

- Most Carbon Calculator tools aimed at the museums and galleries sector are free to use. Many, such as Gallery Climate Coalition's, were created by campaign groups or industry bodies rather than for-profit companies. This suggests a sector where motivated groups are providing tools in the hope that this will prompt and enable action.
- Tools aimed at the UK market use the UK Government BEIS datasets. This has the advantage of being UK-specific and free but is limited when seeking data on materials sourced from outside the UK. Switching to the ecoinvent database may be advantageous as its data is arguably more robust and is global in scope.
- In general, tools for the sector seek to balance usability with specificity and comprehensiveness with most landing on a sliding scale between the two. One way to resolve the need to include data relevant to each user may be to add the ability for users to upload their own materials with accompanying LCA data sheets and Environmental Product Declarations (EPDs).

Museums and Galleries

Name	Carbon Calculator	Carbon Management Tools	The Creative Green Tools
Author/ Publisher	Gallery Climate Coalition	Creative Carbon Scotland	Julie's Bicycle
Region	UK	UK	UK
Dataset Year	2023	2023	2023
Scope	Logistics, Facilities, Print, Packaging	Energy, Water, Waste, Travel, Equipment, Cost, Forecasting	Energy, Water, Waste, Travel + additional qualitative indicators 'beyond carbon'
Platform	Online	Excel	Online
UX / Usability	simple, no summary/ comparison view	distributed analysis across several files, no summary/comparison view	designed, easy to navigate, comprehensive overview screen
User Guidance	Yes	Yes	No
Data Model	BEIS	BEIS	BEIS
Methodology	Yes	Yes	No
Pricing Model	Free	Free	Free - registration required
Comment	Very straightforward to use, but limited in scope	Multiple tools, incl detailed regarding artist equipment, which addresses some additional upstream emissions; carbon budgeting, and cost savings estimation	Only one user per organisation, offers Buildings or Projects options
Link	https:// galleryclimatecoalition.org/ carbon-calculator/	https://www. creativecarbonscotland. com/about/	https://ig-tools.com/ login

Tools for the Wider Culture Sector

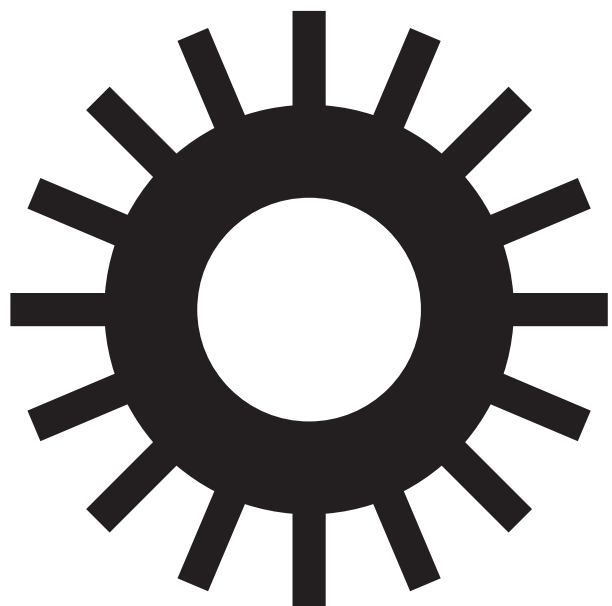
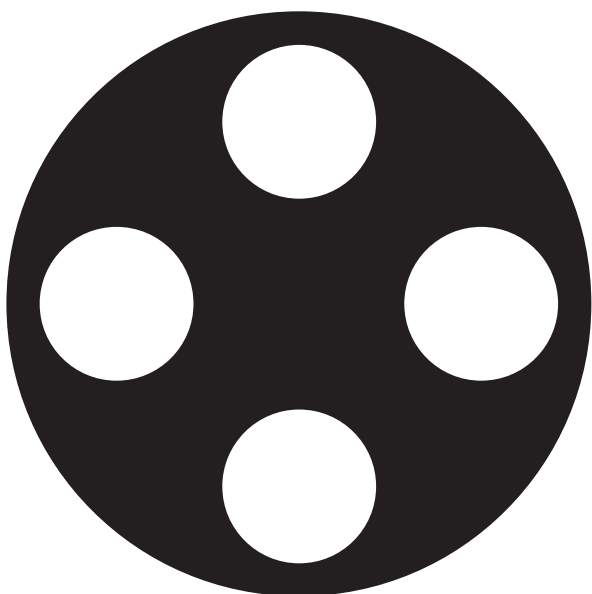
Name	StiTch Carbon Calculator	The 2030 Calculator	TRACE
Author/ Publisher	Foundation for advancement in conservation	Doconomy AB	Isla
Region	Global	Sweden/EU	UK
Dataset Year	2019	2021	2023
Scope	Products (A1-A3)	Products (incl parts), Packaging, Energy, Distribution	Energy, Food & drink, Audience and guest travel & accommodation, Graphics & build, Transport logistics, Waste & recycling
Platform	Online	Online	Online
UX / Usability	most simple/accessible tool, but low design quality	Easy to use, good guidance throughout the process	UNKNOWN
User Guidance	Yes	Yes	Yes
Data Model	ecolnvent 3.6 - cutoff model	Ecolnvent	UNKNOWN
Methodology	Yes	Yes	Yes
Pricing Model	Free	Free – registration	From £2,500 pa
Comment	great for material comparisons via live- updated bar chart, although for some products there's no footprint available yet (=future-ready?)	Tedious for comparing material options	Heavy focus on events
Link	https://stich.culturalheritage.org/carbon-calculator/#browse	https://www.2030calculator.com/	https://traceyour.events/

Tools for the Wider Culture Sector

Name	The Adgreen Carbon Calculator	Albert Toolkit
Author/ Publisher	Adgreen	Albert
Region	UK	UK/Global
Dataset Year	2022	2022
Scope	Transport, Accommodation, Materials, Post-Production, Filming and Non-filming Spaces, Disposal	Energy, Logistics, Accommodation, Materials, Waste, Post-Production
Platform	Online	Online
UX / Usability	UNKNOWN	UNKNOWN
User Guidance	Yes	Yes
Data Model	BEIS + BRE (for international logistics and energy)	BEIS + BRE (for international logistics and energy)
Methodology	Yes	Yes
Pricing Model	Free - registration required	Free - registration required
Comment	Includes organisational perspective, going into great detail about roles and responsibilities Backend is identical to Albert	
Link	https://weareadgreen.org/carbon-calculator	https://wearealbert.org/2023/01/30/albert-toolkit-resources-2/

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Appendices and linked resources:



MUSEUMS AND THE CLIMATE CRISIS

In 2009, the UK National Museums Directors Council (NMDC) developed a set of guiding principles for rethinking policy and practice with the aim of reducing museums' carbon footprint in relation to strict environmental standards for temperature and relative humidity. (https://www.nationalmuseums.org.uk/media/documents/what_we_do_documents/guiding_principles_reducing_carbon_footprint.pdf)

The principles were formulated in response to discussions at meetings of the European Bizot Group, a forum comprising the Directors of many of the world's largest museums. In its recommendations, the NMDC recognised that "the investigation of new designs for museums and improved methods of building is needed".

In 2015, the Bizot Group, comprising the Directors of many of the world's largest museums, agreed to the Bizot Green Protocol. Its guiding principles proposed that "Museums should review policy and practice... with a view to reducing carbon footprints." Among its recommendations was that "the design and build of exhibitions should be managed to minimise waste and recycle where possible". Subsequently, the UK National Museums Directors Council (NMDC) has "adopted these standards and hope they act as guidance for the rest of the museum sector".

(<https://www.nationalmuseums.org.uk/what-we-do/contributing-sector/environmental-conditions/>)

A wealth of initiatives are contributing to the development of responses to the Climate Crisis in the museums sector, and the wider UK culture sector. In particular, non-profit [Julie's Bicycle](#) is "mobilising the arts and culture to take action on the climate and ecological crisis". In 2010, Julie's Bicycle developed a set of Creative Green Tools, a "free set of carbon and environmental calculators to record, measure and understand the impacts" of the arts and culture industries. According to Julie's Bicycle, these tools allow organisations to measure "energy use, water consumption, waste generation and recycling, travel and production materials. The results can then inform your environmental strategy and organisational priorities". The tools are used by 5,000 organisations, in 50 countries worldwide.

In addition, the [Galleries Climate Coalition](#), launched in October 2020, has also developed a highly-regarded [Carbon Calculator](#) for the art sector. The GCC's primary targets "are to facilitate a reduction of the visual art sector's greenhouse gas emissions by a minimum of 50% by 2030 (in line with the Paris Agreement's goal of keeping global warming to below 1.5°C), and promote zero-waste practices". Its Carbon Calculator is tailored specifically for the art world. It provides users with the means to determine and monitor their carbon emissions. "Using the calculator at regular intervals - whilst simultaneously implementing best practice - allows members to track their CO₂e emissions and thus reach their 2030 reduction target," the GCC says.

While both these tools – and others in use in the sector – have proved popular and useful, they do not address the specific requirements of the design and build of exhibitions ([see link for URGE’s comparative analysis of tools currently in use](#)). A distinction should also be drawn between tools which are designed primarily to create data for the purposes of measurement and audits and those which aim to aid decision-making in the creative process. The latter may be used by museums, designers and contractors to inform design and procurement decisions during the planning stages of exhibitions and thus will embed best practice in the minimising of the carbon footprint of such activities. A parallel study “Carbon Measurement Tools in the Creative Industries (CMTCI)” is being conducted by the RCA for the DCMS to understand the variety of tools being used across the creative industries

Glancing across the wider cultural sector, lessons could be learnt from the [Albert tool](#), created by the BBC in 2011 and then adopted by BAFTA. Using the Albert carbon calculator to measure the carbon footprint of productions is now mandatory for anyone producing content for BBC, ITV, Channel 4, UKTV, Sky, TG4 or Netflix in the UK.

MARCH 2023 WORKSHOP: AGENDA, ATTENDEES AND FEEDBACK

On March 1 2023, The Design Museum hosted an Environmental Impact workshop in order to share the work carried out with URGE Collective with the wider museum sector and relevant stakeholders.

Ahead of the event, attendees were asked to read the Guide and test the Impact Model in order to provide feedback on the day. They were also asked to consider the following questions:

- Does your organisation have a sustainability / environmental impact plan and targets in place?
- How is your organisation currently acting on this plan?
- Have you already measured the environmental impact or carbon emissions of an exhibition you’ve worked on?
- What challenges do you face during the exhibition design development process, commissioning design, and measuring impact?

ATTENDEES:

DESIGN MUSEUM:

Justin McGuirk, Chief Curator & Director Future Observatory
Elise Foster Vander Elst, Head of Exhibitions & Environmental Impact Lead
Gabria Lupone, Exhibitions Project Manager & Environmental Impact Manager
Josephine Chanter, Director of Audiences
Tom Power, Head of Facilities
Cleo Stringer, Senior Manager: Exhibitions & Touring

URGE COLLECTIVE:

Patrick Burgoyne
Alexie Sommer
Sophie Thomas
Ralf Waterfield

JULIE'S BICYCLE:

Alice Bonnot, Visual Arts
Graciela Melitsko Thornton, Creative Green Programme Lead

MUSEUM OF LONDON:

Louise Doughty, Head of Exhibitions
Jessica Litherland, Exhibitions Project Manager

NATURAL HISTORY MUSEUM:

Kimberley Lewis, Interim Head of Sustainability
and other colleagues from NHM

ROYAL MUSEUMS GREENWICH:

Raul Leiva Olmo, RMG Design Studio
Katica Puga, RMG Design Studio
Mary Webb, Senior Exhibitions Project Manager

SCIENCE MUSEUM GROUP:

Hayley Marks, Sustainability Manager
Carole Pevny, Senior Project Delivery Manager

UNKNOWN WORKS (3D DESIGN STUDIO):

Ben Hayes, Founding Director
Kaowen Ho, Founding Director
Theo Games Petrohilos Founding Director

V&A:

Melissa Painter, Head of Sustainability
Sarah Scott, Lead Exhibition Production
Evonne MacKenzie, Head of Design

Following introductions, attendees were split into four working groups to explore the questions above. Insights were shared back to the group as a whole following which URGE presented the Design Museum Environmental Impact Guide and the Impact model, inviting attendees to apply both to their next exhibition and feedback on their experience. Follow-up emails and interviews provided further feedback.

KEY INSIGHTS FROM GROUP DISCUSSION AND SUBSEQUENT FOLLOW-UP

“There is a real need for a standardised tracker to measure impacts of exhibitions, so it is great to see this developing.” GRACIELA MELITSKO THORNTON,
CREATIVE GREEN PROGRAMME LEAD, JULIE'S BICYCLE

SUMMARY OF WORKSHOP THEMES AND CHALLENGES

ON THE IMPACT MODEL DEVELOPED FOR THE DESIGN MUSEUM

“[We would] use this as a planning tool rather than for post-exhibition carbon measurement. We are in the process of getting carbon accounting software which will measure all emissions across our estate and operations, so then we can look at how exhibitions fit within our total emissions. However, for organisations who aren’t doing this, the tool is a good way to put a very thorough measure on carbon impacts for an exhibition. Our long-term strategy is to move towards carbon budgets for exhibitions and this tool could help shape the decision-making process, therefore it could be useful in Design and Build as a comparative set of information on Carbon cost that would be equivalent to QS stage cost estimates or as an overall exhibition planner. To use the tool as a planning tool, it needs to be easy to use as it would be used by non-specialists. It’s vital that there is a tool to inform key decisions around loans and materials etc.” **MELISSA PAINTER, HEAD OF SUSTAINABILITY, V&A**

INSTITUTIONAL CHALLENGES

“Everything we have achieved has been in spite of our institutional structure”

BARRIERS TO MEASURING THE CARBON IMPACT OF EXHIBITIONS INCLUDE:

- A lack of sustainability knowledge throughout the organisation. One attendee spoke of a “fundamental lack of understanding of the trade-offs, and value judgements needed and how we make them... when we reach a key gateway decision point, how will we come down on the side of the planet?” Across the sector, interest in and commitment to sustainable goals are very varied. Some, such as the Natural History Museum, have declared a Climate Emergency and committed to targets. Others have barely begun to respond to the Climate Crisis at an institutional level even if individual staff are pushing for action. Those present at the workshop stressed the need for sustainability goals to be understood and embedded across the organisation, with senior leadership commitment. Comparison was made with D&I training - could a similar approach for sustainability be put into practice, perhaps with the support of the Museums Association or other body? There was also a call for sustainability responsibility to be written into job descriptions and KPIs.
- Touring is usually seen as a profit centre. Typical KPIs are around reach and the number of institutions taking an exhibition. Sustainability needs to be included as a KPI in order to give teams ‘permission’ to factor it into decision-making.
- Smaller organisations lack staff members to conduct the work internally or the budget available to get external support resources and skills: could a sector organisation help make knowledge and resources available to all?
- Carbon Budgets, whether per-exhibition or on an annual basis,

are under consideration. Their adoption would help embed more sustainable practices into decision-making and empower staff when dealing with stakeholders. A reliable, fit-for-purpose carbon calculator would be essential for this model to work.

- Lack of time, skills and confidence to use existing carbon calculator tools at the level of exhibition teams. Using these tools requires a certain level of data analyst skills within organisational teams. Some tools are not very user-friendly. A balance must be struck between the level of detail required to produce useful, credible data and the UX needed in order to encourage use by non-specialists in particular.
- Museum operating models typically prioritise a fast turnaround of multiple shows per year, making forward planning for the re-use of materials challenging.

“When planning an exhibition, it would be great to use [the tool] for making decisions on loans. If the long-term ambition is [to have a] carbon budget, then if we have a high number of international loans, carbon has to be cut elsewhere. Helping curators to make decisions of what to include in an exhibition would be really useful. We do this on a very ad hoc basis at the moment.” **MELISSA PAINTER, HEAD OF SUSTAINABILITY, V&A**

RELATIONSHIPS WITH CONTRACTORS

At present, contractors are not generally incentivised to work in a manner which minimises waste and Carbon Impact. Many museums work on a ‘leave no trace’ basis meaning that contractors must remove all materials at the end of an exhibition, mitigating against re-use.

Access to the data on materials from contractors can be very challenging: Some attendees cast doubt on the reliability of carbon data supplied by contractors.

Some museums have sustainable procurement policies in place. Sharing best practice in this space would help as well as a standardised approach to tendering so that contractors would know what was required of them and are better able to prepare.

STAKEHOLDER INTERVIEWS

**ANAÏS AGUERRE, FOUNDER & MANAGING DIRECTOR AT CULTURE CONNECT,
GENERAL SECRETARY OF THE BIZOT GROUP**

The Bizot Group, sometimes called The International Group of Organizers of Major Exhibitions, is a group, founded in 1992, which periodically brings together the directors of museums, constituting a forum for exchanging and discussing ideas.

**INTERVIEW WITH ANAÏS AGUERRE, FOUNDER & MANAGING DIRECTOR AT CULTURE CONNECT,
GENERAL SECRETARY OF THE BIZOT GROUP'**

Anaïs stressed that there is a huge variety within the global museum sector in terms of appetite for addressing Climate Change due both to local market and cultural conditions and size of institution. “There are people who are

very advanced, and people for whom this is very new and who are operating in an environment where you still have climate skepticism.”

In 2014, the Bizot Green Protocol was adopted. Anaïs explained that in the discussions leading to its adoption, great consideration was given to the museum-standard environmental conditions for the display of objects as it was considered as a major driver of museum energy consumption. These standards require museums to maintain galleries at precise levels of temperature and humidity, requiring significant energy use and restricting options when it comes to the design and build of temporary exhibitions. One of the main added-value elements of the Bizot Protocol was relaxing those controls and encouraging alternative climate control solutions (e.g. passive/natural solutions, micro-climate). With this work, the Bizot Group recognised that museums needed to approach long-term collections care in a way that would be environmentally sustainable.

The Bizot Green Protocol Guiding Principles of 2014 stated that “Museums should review policy and practice, particularly regarding loan requirements, storage and display conditions, and building design and air conditioning systems, with a view to reducing carbon footprints. Museums need to find ways to reconcile the desirability of long-term preservation of collections with the need to reduce energy use.” (<https://www.cimam.org/sustainability-and-ecology-museum-practice/bizot-green-protocol/>)

The new Bizot guidelines of 2014 were established on sound scientific research and testing. The research in this field is ongoing and it might be possible to explore rules that are relaxed even further.

It should be noted that environmental standards for the storage, loan, and exhibition of museum collections continues to be a topic of much debate and research within the sector. As a result of the further shifts in knowledge, evidence, technology and appetite for change, the group launched a new working group in December 2022 to refresh the protocol and ease its broader adoption across the museum sector. This work is currently ongoing.

The challenge for the museum sector, as for most other industries, is to operate a shift in our relationship to risk. Anaïs argued that we need to be more comfortable with a degree of measured risk if we are going to respond adequately to the challenge of Climate Change.

The Bizot-member working group referred to above is also studying and trialling various carbon calculators. Anaïs has included the Design Museum tool in this set. Initial feedback from some members of the group on the the Design Museum tool is that it is seen as “very practical”, helpful and easy to understand. The group also highlighted its use as a decision-making tool and compared it to the GCC tool which, it was felt, was more useful for reporting ‘after the fact’. Fuller feedback will only be available at the end of the pilot period due to be completed in December 2023.

This work is responding to a wider need expressed by Bizot Group members for shared practice and standardisation, Anaïs told us. “Developing tools that aren’t compatible or comparable would be a waste of time and energy.”

If any one tool is to emerge as the preferred option for the sector, her members need to be confident that it will be funded, supported and developed in the future. They need to know that it will be continually upgraded and maintained: that it will still exist in years to come so that time spent on training and learning the tool will not be wasted and that it will be possible to produce comparative data using a single methodology.

She compared the current situation with carbon calculators and the possible introduction of carbon budgets to the early days of museums experimenting with digital technology. “A lot of museums were creating their own bespoke digital environments. The result was that those environments couldn’t really speak to one another, which limited the ability of museums to work and collaborate in that sphere... I think what we need for these things to be meaningful, is to have standards that are universal, otherwise, everyone is going to measure things [in their own way] and this information will be meaningless in the context of a cultural organisation working in an international context.”

Anaïs pointed to a lack of resource as one potential barrier to widespread adoption of a carbon measurement tool. “We need to make sure that leaders are acknowledging the fact that this transition takes time, and therefore we need to allocate time and resources to that. But that probably means reducing some other activity, because we can’t really employ more people. Any producer of this calculator, needs to really think about the user experience and how easy it is for people to understand and operate.”

On the question of introducing a system of certification similar to the Albert model, Anaïs again pointed to the disparity among museums in terms of their receptivity to such an idea, mostly reflecting the region in which they are based rather than size of institution. She believes that demand for such a scheme may come from the public who will want visibility on what a museum is doing in this area, in the same way that visitors are beginning to question the sourcing of items for sale in museum gift shops.

She also argued for a method of recognising the educational and cultural value of exhibitions and the presence of certain objects in them. Such benefits could be said to outweigh the negative carbon impact of including a particular object - how do we balance an immediate desire to reduce carbon footprint versus the long-term broader value of giving access to important artworks?

Finally, it is Anaïs’s view that the UK museums sector is in advance of most other countries when it comes to considering carbon impact, a situation that she believes has been helped by the work of Julie’s Bicycle in particular and the way in which that organisation has embedded measurement and reporting requirements in institutional practice. There is an opportunity

for the UK to take the lead internationally in policy and practice in this sector, providing tools and models for others to follow.

FACTORY SETTINGS INTERVIEW WITH ROBERT CLIFF AND SAM MARTIN

London-based Factory Settings designs and builds temporary exhibitions. Clients include many major museums and galleries including the Science Museum, the V&A, Imperial War Museum and the Design Museum, as well as theatres and architects.

THE TENDERING PROCESS, WEIGHTING, CONTRACTS

A rise in interest from institutions in sustainability concerns when working on temporary exhibitions was noted, as was an increase in the weighting given to sustainability in the tendering process. Tenders score applicants on a variety of factors, with a different weighting applied to each. The biggest weighting is typically given to cost, but the relative weighting of sustainability is increasing, Factory Settings believed. There is still considerable variation in this weighting, with FS reporting anything from 5% to 20% given to sustainability. Cost is still the deciding factor, particularly as alternative, more sustainable materials, can often be considerably more expensive.

If FS is not involved until after the design process, that will considerably reduce their ability to suggest or use sustainable materials. Design & Build contracts, where FS has responsibility for both, enhance their ability to use sustainable materials.

FS noted the considerable expense involved for them in the tendering process. In 2021 they were granted ISO 14001 certification (<https://www.iso.org/iso-14001-environmental-management.html>), the standard for having an environmental management system in place. Having 14001 means they can be more efficient in tendering as it allows them to circumvent a lot of detailed questions that they would otherwise have to provide answers to. This further allows them to spend more time on developing specific responses to questions around sustainability ie time saved in the initial tender, frees up hours that can be spent on solutions to requests from the client.

They reported on one instance where a museum had contractually obliged them to track the carbon impact of an exhibition build. In order to do so in a way that satisfied any liability issues, they worked with environmental consultants Giraffe (<https://www.giraffeassociates.com/>) who developed a carbon calculator specifically for that project. However, FS noted that this was a costly solution: having viewed the tDM Impact Model, they felt that such a tool, if it was standardised for use across the sector, would be valuable for the temporary exhibition market, particularly if it was part of a standardised tendering process so that everybody was on a level playing field.

A LACK OF RELIABLE INFORMATION FROM SUPPLIERS

FS noted that there is a lack of reliable data on carbon from their supply chain, particularly from the steel industry. They believe there is a lack of clarity over, for example, virgin versus recycled materials and unreliable tracking of materials. The industry has not engaged sufficiently with its responsibilities in this area to provide credible, reliable data. Working with Giraffe, which has its own methods of calculating the estimated impact of materials, allowed FS to report data to the client that they could rely on.

THE CHALLENGES OF RE-USING MATERIALS IN EXHIBITIONS

Current museum ways of working make it difficult to recognise the financial value of reusing materials from one exhibition to the next. Most temporary exhibitions have their own individual budget. There is often no mechanism for spreading the cost of a material that can be reused across multiple exhibitions. If a single contractor was able to bid on, and win a contract for, multiple exhibitions (where the designs were already at an advanced stage) across several years, this would allow contractors to use materials more efficiently and plan for re-use in line with the design. FS cited the example of a prominent auction house which commissioned a set of movable walls 15 years ago that are still in use today.

Current procurement rules for certain publicly funded institutions, FS believe, would also prevent contractors from joining forces to purchase sustainable materials at lower prices and/or to meet minimum order requirements that can preclude their use in temporary exhibitions.

When it comes to building temporary exhibitions using materials that have previously been used elsewhere, FS highlighted the indemnity and liability issues they would have as contractors. Typically they are expected to provide certification for and guarantee materials that they use - this would be much more complex when re-using materials from other sources as they would not necessarily have sufficient data about the way in which materials had been previously stored or used.

As for re-using materials from a temporary exhibition elsewhere, one barrier is the fire safety requirements for museums. Fire retardant coatings make materials such as MDF more complex to recycle, adding cost. Where FS have had success is in passing on materials to be used in less restrictive contexts such as skate parks.

Re-using assets such as plinths from one exhibition to another could be more straightforward, FS said, but would be reliant on compliance with a museum's health and safety and insurance policies. A plinth will typically be rated to be safe for use up to a certain weight. Once installed, the plinth would typically become the property of the museum and so it could re-use it safely in the knowledge that it had been guaranteed to the specified weight. It could also be shared with other institutions provided it still had the rating information on it.

On the concept of a BARDER-style platform for sharing assets such as

plinths, FS thought it a good idea which, providing the correct paperwork accompanied each asset, was workable but that the major barrier would be financing such a system.

WORKING TO A CARBON BUDGET

FS believed this was possible proving there was standardisation of carbon calculators used and that all contractors were working to the same set of rules. Contracting for temporary exhibitions is highly competitive and tendering can be costly and complex so it is essential that there is clarity and consistency in processes and regulations.

GALLERY CLIMATE COALITION INTERVIEW

Notes from research interview with Danny Chivers, Environmental Policy Advisor and Carbon Footprinting Expert, and Heath Lowndes, Managing Director, Gallery Climate Coalition <https://galleryclimatecoalition.org/>

- The Gallery Climate Coalition was formed in October 2020 following 10 months of research and development. It was initially made up of representatives from commercial art galleries, art fairs and journalists searching for information on how to reduce their carbon impact. The GCC now has over 800 members internationally, including not just galleries but also artists, shippers and auction houses.
- The original intention was to stage an event for the art world to share knowledge and best practice. Following COVID 19, this plan was revised to focus the organisation on providing information that will enable members to take action.
- An initial audit of a selection of founding GCC member galleries identified that *shipping objects, transporting people* and *energy use* were the three major contributors to a gallery's carbon footprint. A suite of resources and best practice guidelines was then developed alongside a free-to-use Carbon Calculator.
- The Carbon Calculator was specifically designed for the art gallery sector. It prioritises ease-of-use and the three major areas of concern outlined above. While it is not designed to produce the detailed data required by a full carbon audit, it does produce data accurate enough to track impact and set targets, which is in line with the GCC's focus on enabling action by members. Using the data from the Calculator, GCC members are encouraged to publish carbon reports on their operations in order to align the sector and promote collective action.
- GCC identified time and a lack of specific resources as key barriers to use of the Calculator. They identified the need for training for gallery staff on the basics of 'Climate Emergency literacy' and the need to measure impact.
- User feedback and data has informed GCC's development strategy. It has noted that members have been using the Calculator for over 3 years and feedback has identified that members want to use the calculator not just for reporting but also to compare the potential impact of future exhibitions/ projects. This has been driven by a shift in membership toward public institutions alongside commercial galleries.

- Scoping for the next stage of development has also included a focus on improved presentation of data via dashboards and the provision of advice based on data recorded as well as enabling members to tailor the Calculator to their specific areas of interest.
- GCC noted that it has recently been in receipt of research funds to extend its remit to exhibition building and suggested collaborating with URGE Collective at tDM, using the research and toolkit developed for tDM's Guide and Impact Model.
- Following conversations with peer-to-peer exhibition assets sharing platform BARDER (see below) and US-based Artists Commit, GCC has investigated the feasibility of a system for the re-use of exhibition assets such as vitrines, cases and plinths.
- GCC stressed the importance of developing standardised tools for the sector in collaboration with other interested parties such as URGE Collective and tDM in order to avoid duplicated effort and promote collective action.

BARDER INTERVIEW WITH FOUNDERS LAURA LUPTON AND JAE CHO

BARDER is a peer-to-peer resource sharing tool for the arts. It enables museums and galleries to share assets such as plinths, vitrines and other exhibition materials via a digital platform.

Users can post items for sale, trade, to lend or give away on the free-to-use platform. Those looking for items can then source what they need from posted items. "And in doing so, reduce waste, recover valuable space, lower operating costs, foster industry connections, and invest in a circular economy. You can think of BARDER as a collective inventory of material shared across all users, or as an industry specific commons."

All transactions are peer-to-peer and the responsibility of the user. BARDER has no storage facility and does not guarantee the condition of any items.

It currently operates principally in New York City and Los Angeles, but has run the Barder Shuttle, a 3-month pilot coinciding with Frieze London in conjunction with Queen's Fine Art Transport and GCC. The Barder Shuttle provided free transport for items shared under the scheme "such as crates, frames, fabric, plywood, as well as any furniture pieces you no longer need" (<https://www.queensfineart.com/blog/barder-shuttle-your-questions-answered/>)

Its main users are the larger museums and galleries in New York who use it principally to offload items to smaller galleries and artists after an exhibition has ended. The most commonly shared items are crates and pedestals.

An important additional benefit of BARDER is in building community, connecting people in the art world around a common goal. Relationships build through using the system.

BARDER believes that the US museums sector is considerably behind the UK and Europe in terms of reporting and reducing carbon impact, though they do report a rise in interest for reporting on individual exhibitions. It has a relationship with GCC and recommends their Calculator to institutions.

The STiCH Carbon Calculator (<https://stich.culturalheritage.org/carbon-calculator/#browse>) is also used. STiCH works “towards providing a clear path to reducing the carbon footprint from cultural heritage activities worldwide”. It is chiefly concerned with the treatment, packing, storage and exhibition of objects in the culture heritage sector.

Use of BARDER is often listed in Climate Impact Reports but BARDER does not itself provide carbon data relating to objects listed or their transportation. One barrier to using BARDER in the US is that museums that have a nonprofit charity status are barred from giving items away for free unless it is to another nonprofit. BARDER addressed this by creating a version of the platform just for nonprofits.

BARDER expressed a willingness to work with UK museums to develop a pilot project for use of the system in the UK.

ALBERT

IN OUR RESEARCH, ALBERT ([HTTPS://WEAREALBERT.ORG/](https://wearealbert.org/)) WAS CITED AS A POTENTIAL MODEL FOR THE SECTOR.

Albert was founded in 2011, originally as a BBC project which was then taken up by BAFTA and now operates as a standalone business. Its mission is to “support the global Film and TV industry to reduce the environmental impacts of production and to create content that supports a vision for a sustainable future”.

Albert has built a toolkit which consists of a carbon calculator and Carbon Action Plan. The calculator allows programme and film-makers to measure the carbon footprints of productions: the Carbon Action Plan allows them to formulate ways of reducing that footprint in the future.

Anyone producing content for BBC, ITV, Channel 4, UKTV, Sky, TG4 or Netflix in the UK is mandated to use the carbon calculator to measure the carbon footprint of productions. Producers completing a Carbon Action Plan are awarded Albert Certification (with a rating of 1-3 stars) and can use the logo on the end boards of programmes and films to indicate that the content has been produced under the standards of the scheme.

Albert supports participants with resources and how-to guides as well as schemes such as Creative Energy, which gives producers access to a preferential renewable energy tariff.

In combining the calculator and the Carbon Action Plans, and providing certification as a reward for participating in the scheme, Albert recognises that the importance for producers lies not just in acting to reduce their carbon impact but also in being seen to do so.

In 2021, the Advertising Association partnered with Albert and BAFTA to launch a carbon calculator for the advertising industry under the Advertising Association's AdGreen scheme.

Observations for the museums and galleries sector:

Albert's success lies in part in its support and adoption by a core group of major stakeholders. Crucial to this is the mandating of its use by these stakeholders, both for their own productions and for programmes and films made by third party production companies. The likes of BBC, ITV and Channel 4 serve on the Albert management body.

The presence of the Albert logo at the end of a programme or film is a very visible, recognisable commitment to reducing carbon impact. A similar mark could be used to indicate that an exhibition has been produced under a carbon impact measurement and reduction scheme in the museums and galleries sector.

The Carbon Action Plan ensures that Albert goes beyond measurement and helps participants to reduce their carbon footprint.

The AdGreen carbon calculator indicates that Albert could be open to sharing its technology with partners from other sectors. Albert and AdGreen could both serve as models for the museums and galleries sector.

ABOUT URGE COLLECTIVE: URGE COLLECTIVE IS A GROUP OF LEADING DESIGNERS, STRATEGISTS AND WRITERS WORKING TO HELP ORGANISATIONS RESPOND EFFECTIVELY TO THE CLIMATE CRISIS, [URGECOLLECTIVE.COM/](https://urgecollective.com/)

The URGE project team that came together for this work are:

PATRICK BURGOYNE Editor of Creative Review magazine from 1999 to 2019. Author of several books on design and visual culture and contributor to publications including The Guardian, The Observer and The Independent;

ALEXIE SOMMER Designer and communication expert who focuses on business sustainability to deliver positive impact through strategic thinking and design intuition. Previous roles with Thomas Matthews, The Guardian & Observer, LOCOG, British Council;

SOPHIE THOMAS Founding Director of Thomas Matthews communications studio with over two decades of experience in sustainable design and behaviour change. Created and led the Great Recovery project with RSA & Innovate UK investigating the circular economy;

RALF WATERFIELD Industrial Ecologist working across multiple sectors to help clients identify and monitor key levers for reducing the impact of their products, operations and supply chains. Specialising in life-cycle assessment, carbon footprinting and sustainability action planning.



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