

Hybrid Futures Climate Case Study: the Poetics of Water Exhibition at Castlefield Gallery, summer 2023

The mixed media show *Poetics of Water* opened at the Castlefield Gallery in Manchester on 25th June 2023. The exhibition – featuring paintings and ceramics by Parham Ghalamdar, and cyanotype prints and audio pieces by Jessica El Mal – was the second of the Hybrid Futures branded exhibitions to open, and ran until 24th September 2023.

As part of the HF project, staff at Castlefield Gallery, with help and support from the artists, collected as much data as they could about the energy, transport and material use associated with the exhibition (including some travel and accommodation from the wider HF project that helped to inform the exhibition). This information was then analysed by the Environmental Advisor to the project, Danny Chivers, to see what could be learned about the climate impact of the show.

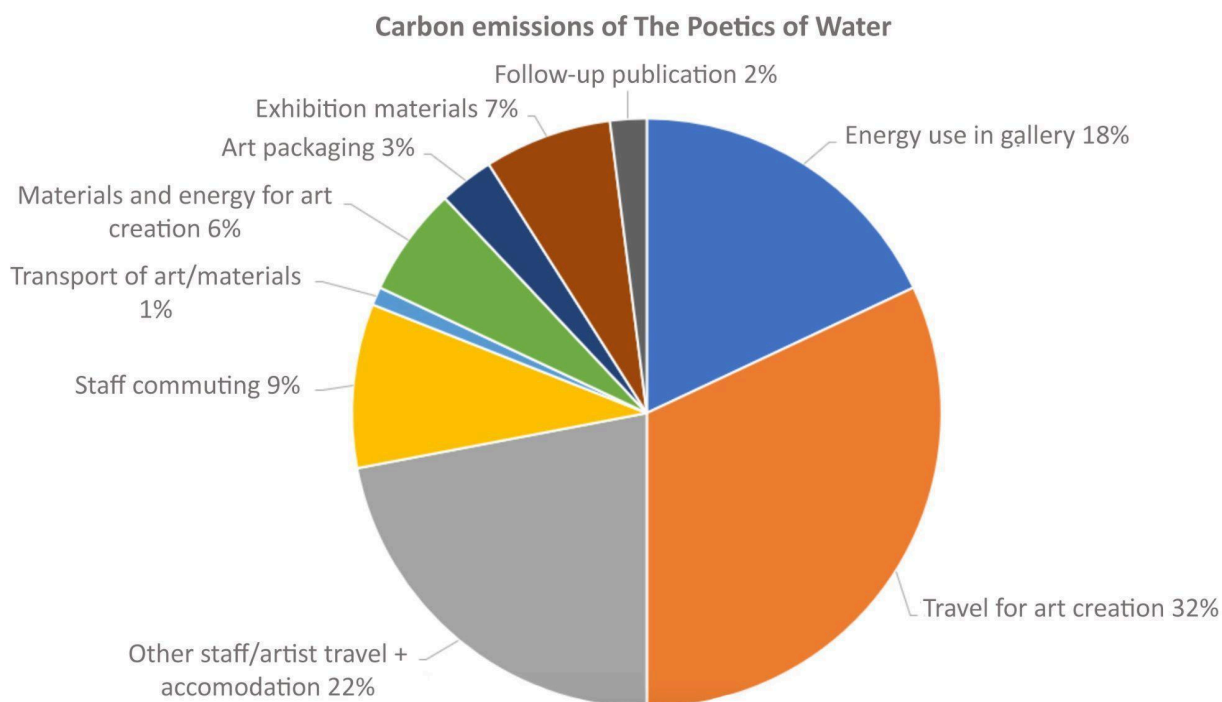
● This produced the following headline results:

Activity	Sub-category	Energy or resources used	Calculated carbon emissions (kgCO ₂ e)	Notes
Creation of artworks – Jessica El Mal	Materials - fabric	Assumed light cotton fabric, 18 m ²	20	
	Materials - paper	Paper for 1.2 m ² of framed artworks – assumed double the amount of paper for offcuts etc	0.3	
	Materials - ink/printing	Minimal	Minimal	The artist carried this out using cyanotype and screenprints with water-based inks. Water-based inks have a lower environmental impact than

				petrochemical-based inks, but as they dry so quickly, they require a lot more water.
	Flights to/from Morocco	A single one way flight	382	The artist flew to and from Morocco for multiple purposes, not just for the artwork. We have therefore allocated one single flight to the project.
	Travel within Morocco	4 Trains Marrakesh - Casablanca	18	Travel specifically for the project
		Car travel Marrakech city to Oukaimeden, two return journeys	51	Travel specifically for the project
		Bus travel	23	Travel specifically for the project
Creation of artworks - Parham Ghalamdar	Ceramics	Around 50 kg of glazed ceramic	23	
	Paintings	Estimated 6.1 kg of canvas, 6.1 kg of frame and 1.5 litres of paint	48	41 kgCO ₂ e from the canvas (85%), 5 kgCO ₂ e from the frame and 2 kgCO ₂ e from the paint
Transport of artworks locally	Moving art between locations	Two van journeys within Greater Manchester	9	Assumed 40 km total
Packaging of artworks	Jiffy canvas painting storage, transport wallets, plastic crates, some consumable tape	Weights estimated, assumed to be 75% card 25% plastic. Plus 10 kg of plastic crates and lining for packing ceramics.	51	Mostly passed on to the University of Salford Collection for reuse
Travel and accommodation for exhibition planning/events	Travel in the UK (trains)	Around £1000 spent on trains	182	Distance of around 5100 km estimated based on average train prices in the UK
	Flight from Paris for artist workshop	One way flight	107	
	Accommodation	4 x hotel nights in London	46	
	Data storage and transfer	Minimal	Minimal	

Setup of exhibition	Local transport of exhibition materials	Two uber journeys within Greater Manchester, plus two car trips from framing company	4	Assumed 10 km total.
	Travel by other contractors (tech support, decorators etc)	Two people travelling by bicycle	0	
	Purchased materials for framing, display, labelling	Jessica's works were float mounted with solid dark wood frames	0.5	Relatively small as most materials were re-used from previous exhibitions
	Printing of handouts	500 A4, plus 400 A3 for Parham	8	
	Paint for decorating space	Around 20 litres	72	
	Exhibition furniture		0	All repurposed from previous exhibitions and set aside to use again, so no additional footprint.
	New equipment bought for exhibition	Special new lights - 4 x 1.1 kg each	25	Other than the lights, pre-existing kit was used or hired for the project
Energy use at gallery during exhibition	All energy use in building that could be linked to exhibition	1221 KWh of electricity (the property does not use gas)	275	Based on meter readings, including estimated back office energy – see below
Visitor travel to exhibition	Data not available	See below	See below	See below
Staff commuting	See below	Most walk or cycle, some tram/train/hybrid car	135	Approximate, allocated through similar method to energy – see below
Follow-up publication	Production of Parham's post-exhibition publication	Estimate based on 100 copies of a 100-page document using conventional printing methods (see below)	30	Please note that this publication was not part of the exhibition The Poetics of Water, but was part of Hybrid Futures
TOTAL			1510	

Estimated carbon footprint of Hybrid Futures Poetics of Water exhibition (and associated Hybrid Futures project activities) at Castlefield Gallery (kgCO₂e): 1,510 kg



The above chart shows the approximate breakdown of the greenhouse gas emissions associated with the travel, transport, energy and materials required to create the artworks for The Poetics of Water, get them to the gallery and set up (and take down) the exhibition. These include some estimates and allocation decisions as described in the table above.

It also includes an estimate for the electricity used at the gallery to create and run the show (including back office functions); and an estimate for the staff commuting allocated to the show. See the Appendix below for more information on how these were calculated.

The exact methods used for printing the follow-up publication produced by Parham Ghalamdar were not fully confirmed at the time of writing this report, so an estimate has been used based on conventional printing methods. In reality, this figure may turn out to be significantly lower as more environmentally-conscious printing options are being considered for this.

Note that the aim of creating this footprint is to identify good practice and opportunities for action, both for Castlefield Gallery in particular and for other arts organisations in general. It is presented as an illustrative example, for educational purposes, in the hope of informing and inspiring further environmental action. It is not intended for comparison or benchmarking against other exhibitions or venues, including other shows within the Hybrid Futures project, as every exhibition has its own unique context and situation (including location, time of year, specific intended audience, availability of data and so on) that can limit the usefulness of such comparisons.

All carbon figures have been calculated in line with the World Resources Institute Greenhouse Gas Protocol (the global standard for carbon auditing), mainly using conversion factors from the UK Government and the [Idemat database](#). For more details on the exact methodology and

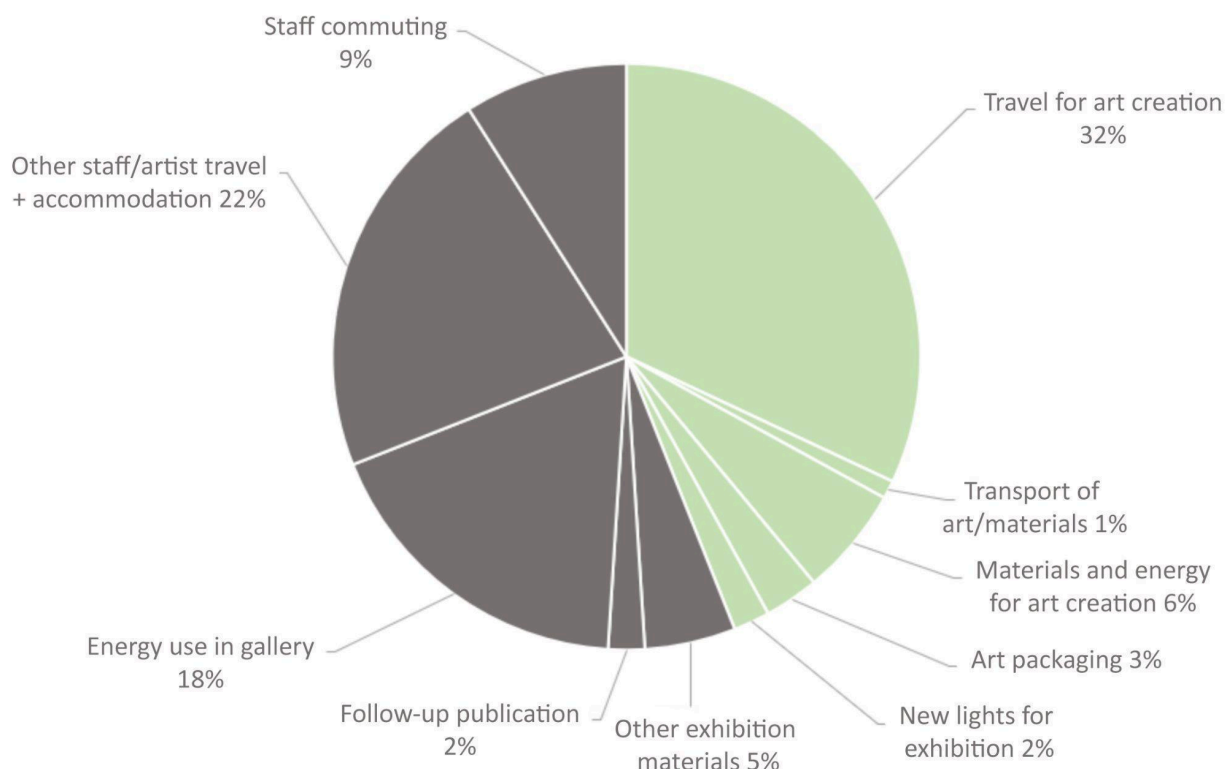
assumptions used in this case study, please contact us at artcollection@salford.ac.uk marking your query 'Hybrid Futures methodology'.

● Good practice to highlight

The exhibition's emissions came to a total of around 1.5 tonnes of CO₂e (1510 kg). This is roughly equivalent to driving from Manchester to Bradford and back in an average car for every day that the exhibition was open.

Some key decisions that helped reduce these emissions:

- In order to reduce her impacts, Jessica El Mal used cyanotypes and screen printed with water-based ink. Although this removed the impacts of using standard petro-chemical derived inks, the water-based inks dry very quickly and so required a lot more water use.
- The great majority of furniture, display materials and equipment used for the exhibition were pre-existing items or hired, meaning minimal new materials were purchased.
- Contractors for the setup were local and travelled in by bicycle, giving them a negligible carbon footprint.
- The decision to work with artists based in the North West of England also reduced the amount of travel required.
- As the exhibition took place in summer, the gallery spaces required no heating, and natural cooling and ventilation was sufficient to maintain an appropriate temperature and humidity in the gallery without the need for extra air conditioning/climate control.
- Staff at Castlefield Gallery are also diligent about saving energy wherever possible, by turning off lights and equipment when not in use.
- The artworks, exhibition materials, equipment and most of the packaging will have a continued life after the exhibition, thus helping to reduce the footprint of future exhibitions and events. This means that over 40% of the carbon footprint is associated with items that will be used again, as shown in green in the chart below:



● Some key things to note for the future:

- The two relatively short flights taken in relation to the exhibition made up 33% of the carbon footprint of the exhibition (490 kgCO₂e). This was partly because the rest of the exhibition's footprint was so low.
- Energy use made up around a fifth of the footprint – and if the exhibition had happened in winter, this would probably have been significantly larger. This highlights the importance of energy reduction – and energy decarbonisation – in the buildings where exhibitions like this are housed and displayed. Castlefield Gallery staff are investigating ways to improve this in future.
- Future printing for Castlefield Gallery will mainly be carried out using low-impact riso printing.
- Staff commuting has been included in the total for the exhibition, but it should be noted that responsibility for this impact is shared between the gallery and its staff. The impact here is relatively low, due to the minimal amount of driving being carried out on staff commutes. Castlefield Gallery's commuting footprint works out at around 0.7 kg CO₂e per commuter per day, significantly lower than the UK average of 3.2 kgCO₂e per commuter per day.
- Another important area of shared responsibility is visitor travel emissions. This hasn't been included here as data were not available on visitor numbers and travel methods. We are attempting to collect this information for the Salford Hybrid Futures exhibition and hope to say more about it in that report.

● Going beyond carbon

While this study focuses on the climate impact of the show, it's important to remember this isn't the only environmental crisis we are facing. Some other potential environmental hotspots for future consideration include:

- Whenever chemical products are used in significant quantities, there is the risk of toxic materials entering the environment, through the manufacturing process as well as from the use of the product. In this case, standard Dulux paint was used to decorate the exhibition space (to meet the specific colour requirements of the exhibition). Castlefield Gallery staff have expressed interest in learning more about more environmentally friendly paint brands in the future.
- Castlefield Gallery avoids the use of vinyl printing for information boards, with the use of a front-of-house display screen and a limited number of paper printouts.
- The reuse of exhibition furniture, equipment, materials and most of the packaging is a positive step for reducing pressure on global resource use, biodiversity loss and the waste crisis. A small amount of consumable packaging materials (tape, paper) did end up in the waste stream.
- The issues raised by the exhibition itself will hopefully have had a positive effect on the understanding, engagement and motivation to act of the audience attending the show. This is of course very difficult to measure though!

APPENDIX: Estimating energy use and staff commuting

Energy use for the exhibition

This is often a challenging item to calculate for an art exhibition. For Castlefield Gallery – as for many cultural buildings – the energy use of the entire property is included in the energy meter readings. However we need to estimate how much of that energy was consumed by the exhibition itself, how much by office staff working in support of the exhibition, and how much for other activities unconnected to the exhibition.

This leaves us with three possible choices:

Option A: Divide up the property based on m² of floor space. So if the gallery space (for example) took up half of the property, and the other half was office space, then we could say 50% of the energy used during the exhibition was directly used by the gallery space, while the other 50% was allocated to office functions. We could then calculate the average energy used by each member of staff per working day in the offices, based on the total working days spent per year, and then multiply that by the total staff days spent working on this particular exhibition (including time spent before and after for planning, takedown etc).

This method assumes that the energy use per square metre is roughly the same in the gallery space and the office space. It also requires some time-consuming data collection with regard to working out how many staff days were spent on different projects over the course of a year or more

Option B: Assume that staff time spent on the exhibition is roughly proportional to the length of the exhibition itself. So if an exhibition was three months long, then we would assume that, on average, staff spent about a quarter of their employment hours that year working on that exhibition (because three months is a quarter of a year). Some of this time would be during the exhibition, some would be before or after, but it would add up to roughly the same amount of time as the exhibition length. This allows for a much more straightforward calculation – we assume that the total energy used within the building during the exhibition is a decent estimation for not just the exhibition itself but the staff time required to create and manage it.

This method does require a slightly rough assumption about staff time spent, but has the advantage of being straightforward to calculate without extra data collection, beyond the energy metering/billing figures.

Option C: Calculate the energy use from the “bottom up” – in other words, estimate the energy use of the lights, equipment, etc required for the show, and the lights, laptops etc used for supporting office functions. This requires much more granular data collection and various assumptions about staff working time, the allocation of heating energy etc.

Of the three options above, all require some estimates and assumptions and so it's hard to say which is the more accurate – it will vary from case to case. In this case, we have gone with Option B as it was the most straightforward with regard to the data we had available – particularly because we had exact meter readings for the building during the length of the exhibition. This told us that 1696 KWh of electricity were used during the 16 weeks of the exhibition (including setup and takedown), resulting in 382 kgCO₂e. Castlefield Gallery staff then estimated that around 28% of staff time in that period was spent on other work not related to the exhibition, so we took 28% off the total to leave 1221 KWh and 275 kgCO₂e. The 28% represents staff time used for non-exhibition related activities such as the gallery's various artist development programmes and managing New Art Spaces.

Staff Commuting for the exhibition

While it's fairly straightforward to calculate the total emissions from staff commuting over a particular period, deciding how much of this to allocate to a specific project or exhibition can (as with energy use) be challenging.

The most straightforward method is to use the same assumption as for Option B for energy use, above – to assume that the proportion of staff time spent on the exhibition over a year works out roughly the same as the length of the exhibition itself. With this method, we can allocate 16 weeks' worth of staff commuting directly to *The Poetics of Water*.

Staff collected data specifically for this period, and found that while most journeys were taken by foot or by cycling, there was also around 3250 passenger-km of train travel (115 kgCO₂e), 280 passenger-km of tram use (8 kgCO₂e) and 540 vehicle-km of hybrid car use (64 kgCO₂e) over the 16 weeks. This resulted in a total of 188 kgCO₂e. Castlefield Gallery staff then estimated that around 28% of staff time is generally spent on other work not related to exhibitions, so we took 28% off the total to leave 135 kgCO₂e.