Hybrid Futures Climate Case Study #2

GRUNDY x LIGHTPOOL x HYBRID FUTURES **autumn/winter 2023**

GRUNDY x LIGHTPOOL x HYBRID FUTURES opened at the Grundy Art Gallery in Blackpool 10 October – 16 December 2023. The exhibition featured two neon pieces by artists RA Walden and Shezad Dawood, part of a larger light-themed programme by the Grundy featured in the town's annual *Lightpool* festival.

Staff at Grundy 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. This information was then analysed by Hybrid Future's Environmental Advisor, Danny Chivers to see what could be learned about the climate impact of the show.

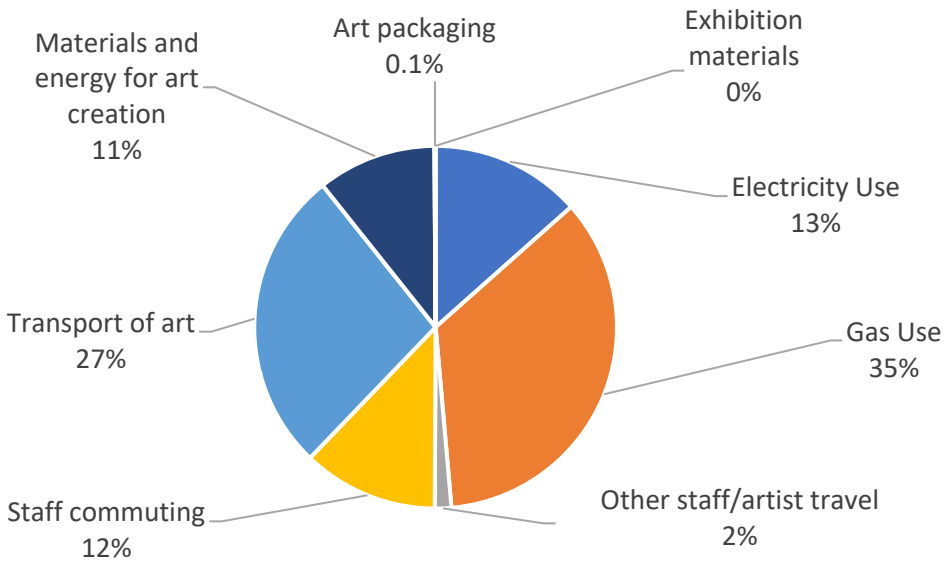
This produced the following headline results:

Please note that these figures relate specifically to the Hybrid Futures section and not the whole Lightpool exhibition at the Grundy Art Gallery.

Activity	Sub-category	Energy or resources used	Calculated carbon emissions (kgCO2e)	Notes
Creation of artwork by RA Walden	Materials - glass	8 glass tubes, 300 grams each, from Italy	13	The artwork needed to be manufactured twice, so all values have been doubled – see below
	Materials - noble gases	Trace amounts	Negligible	
	Energy use at workshop	22 litres of propane, based on the average rate of fuel use at the workshop	67	

		32 KWh of electricity, calculated from the specifications of equipment used at the workshop	14	
	Travel by artist	None	0	
Creation of artwork – Shezad Dawood	Neon artwork	Work already existed	0	
Transport of artworks locally	Workshops to gallery	3 return journeys from Wakefield in a van with 2 litre engine	393	
Packaging of artworks	Cardboard and paper	Approx 2 kg of paper and card	2	
Planning travel and accommodation	Travel for the wider HF project	One 9km car journey and one 11 km bus journey	3	
Setup of exhibition	Travel by other contractors (tech support, decorators etc)	Data not available, so estimated at 110 km by car	19	See below for estimation method
	Purchased materials for framing, display, labelling	Minimal	0	Almost all materials were re-used from previous exhibitions
	Exhibition furniture	Minimal	0	All repurposed from previous exhibitions, and set aside to use again, so no additional footprint.
	New equipment bought for exhibition	None	0	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 the HF part of the exhibition	Estimated 178 KWh for the neons, 431 KWh for lighting and 258 KWh for back office energy.	195	See below for estimation method
		Estimated share of building gas use: 2834 KWh	510	See below for estimation method
Visitor travel to exhibition	Data not available	See below	See below	See below
Staff commuting	Share of staff commuting allocated to Hybrid Futures	Mostly by car	176	See below
TOTAL			**1392**	

Estimated carbon footprint of Hybrid Futures Lightpool exhibits at Grundy Art Gallery ($kgCO_2e$)



Note: these results have been updated with improved energy, transport and materials data since the provisional results were displayed in the Hybrid Futures exhibition at Salford Museum and Art Gallery in March 2024. The updated calculations have resulted in a very similar emissions total to that previously reported, but some slight differences within categories.

This comes to a total of around 1.4 tonnes of CO_2e (1392 kg). This is roughly equivalent to driving from Blackpool to Manchester and back in an average car every day that the exhibition was open.

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, get them to the gallery and set up (and take down) the exhibition.

It also includes estimates for the electricity used at the gallery to create and run the Hybrid Futures section of the larger exhibition (including back office functions), as well as estimates for the staff commuting and contractor travel allocated to the Hybrid Futures part of the show. See the Appendix below for more information on how these were calculated.

RA Walden's piece *the universe is a clock (i) schrödinger's equation, time dependent* needed to be manufactured twice, due to a malfunction in the first copy. This has been accounted for in the art materials and energy footprint.

Good practice to highlight.

Some key decisions that helped reduce these emissions:

- The neon artworks were switched off outside exhibition times, as was gallery lighting.

- Materials used for mounting and displaying the neons and for setting up the wider exhibition were almost entirely pre-existing items or hired, meaning negligible new materials were purchased.
- No walls were repainted for this exhibition (the footprint of paint manufacture was a significant part of the previous two Hybrid Futures exhibition footprints).
- One of the Hybrid Futures exhibits was a pre-existing artwork, requiring no extra manufacturing materials or energy.
- The decision to work mainly with artists and workshops based in the North West of England reduced the amount of travel and transport required.
- No flights were taken with respect to the Hybrid Futures artworks.
- Staff at Grundy are diligent about saving heating energy wherever possible, by keeping the heating at the minimum levels required for comfort and safety.
- The artworks, exhibition materials, and equipment will have a continued life after the exhibition, thus helping to reduce the footprint of future exhibitions and events. This includes the first version of RA Walden's artwork, which has been retained by the Grundy Gallery (it has an interesting story of its own to tell in relation to sustainability).

Key things to note for the future:

- Over the course of the exhibition, the two Hybrid Futures neon works were estimated to use around 178 KWh of electricity, creating approximately 40 $kgCO_2e$. This represents 6% of the total carbon footprint of energy use for Hybrid Futures at Grundy (including heating, lighting and back office functions). This shows that the use of neon does have a noticeable impact on the carbon footprint of an event, and should be used as efficiently as possible, but that other types of energy consumption (particularly lighting and heating) are still much more significant.
- Related to this, the power consumption of the lighting at Grundy is higher than that used by other Hybrid Futures partners. For example, the lights at Touchstones Rochdale each consume between 9 and 11 Watts, while the Grundy lights use 100 Watts each. This could be worthy of further investigation.
- Unlike the first two Hybrid Futures exhibitions (at Touchstones and Castlefield), this exhibition took place in autumn/winter, and so heating energy made up about a third of the footprint. This highlights the importance of energy reduction – and energy decarbonisation – in the buildings where exhibitions like this are housed and displayed. Grundy staff are investigating ways to improve this in future.
- 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 high, as most staff do commute by car. Grundy's commuting footprint works out at around 6.9 $kgCO_2e$ per commuter per day, more than double the UK average of 3.2 $kgCO_2e$ per commuter per day. This may at least partly reflect the availability and reliability of public transport in the Blackpool area as compared with other UK cities.
- 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 Museum & Art Gallery 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:

- Many manufacturing processes can lead to other pollutants entering the environment in addition to greenhouse gases. In the case of glass manufacture, this can include nitrogen oxides, sulphur dioxide and airborne particulates. No information was available on the exact manufacturing process or pollution levels associated with the Italian-made glass for the neon in this case – although EU regulations hopefully mean they were lower than they might have been.
- The reuse of exhibition furniture, equipment, materials and the minimal use of packaging is a positive step for reducing pressure on global resource use, biodiversity loss and the waste crisis.
- 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 can be 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 the Grundy – 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 m^2 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 a hybrid of all three methods, based on having the following data available:

- Electricity and gas use for the whole building, metered specifically for the dates of the exhibition
- The floorspace taken up by the Hybrid Futures exhibition, equivalent to 17.5% of the display space in the gallery as a whole
- The energy ratings of all the artworks on display in the building, not just the neons, along with the energy ratings of the lighting.

The total electricity use for the whole building over that 78-day period was 5329 KWh. The exhibition was open and running for 56 of those days, during which time the gallery lighting and artworks (including neons, laptops, monitors and projectors) consumed an estimated 3270 KWh, according to their power ratings and the length of time they were switched on. This suggests that the other functions of the building (office facilities, humidity control, storage, bathrooms etc.) consumed around 5329 – 3270 = 2059 KWh of electricity, an average of 26 KWh/day over 78 days.

On the 56 days of the exhibition, the two Hybrid Futures neons (based on their power rating) consumed an estimated **178 KWh** of electricity. The lighting across the gallery consumed an estimated 2464 KWh; assigning 17.5% of this to Hybrid Futures (based on the gallery space occupied) gives us **431 KWh**.

If we then assume – as with Option B above – that staff spend their office time each year in rough proportion to the length of each exhibition, then we can allocate the electricity used for all other building functions including office space, directly to the exhibition. If this is 26 KWh/day, then that means 26 x 56 x 17.5% = **258 KWh** allocated to Hybrid Futures.

The gas meter figures for October– December 2023 average out at 289 KWh of gas per day. Using the same allocation method as above, this gives us a total of 289 x 56 x 17.5% = **2834 KWh** allocated to Hybrid Futures.

Staff Commuting for the exhibition

While it's 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 simple 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 11 weeks' worth of staff commuting directly to the Hybrid Futures Lightpool exhibition.

Staff collected data specifically for this period, and found there was around 5877 vehicle-km of car travel (1344 $kgCO_2e$), and 212 passenger-km of bus travel (25 $kgCO_2e$) over this period. Allocating 17.5% of this to Hybrid Futures, based on the amount of exhibition space assigned to the show, resulted in a total of 176 $kgCO_2e$.

Contractor Travel
This needed to be estimated as data were not available.

Travel for contractors to set up the Hybrid Futures exhibition at Touchstones Rochdale required a total of 638 km of car travel, resulting in 106 $kgCO_2e$ of emissions. Assuming a similar level of set-up time and complexity for Grundy, and then allocating 17.5% of those set-up emissions to Hybrid Futures (based on the proportion of the exhibition it takes up, above) gives an estimated figure of 19 $kgCO_2e$.

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'.