



“A Doll’s House”

A Practical Investigation Into Sustainable Theatre.

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Introduction

Following the experiment last year where we measured the environmental impact of the show *A Little Voice A Long Way From Here* produced by Norfox (Library Theatre's youth theatre), the Library Theatre Company felt ready to have another go! This time we decided to measure the environmental impact of our show *A Doll's House* which took place at The Lowry in January and February 2011. We felt that, despite the complex work involved in doing this that it was a worth while exercise for two main reasons:

- It is not possible to lower the environmental impact of our work in the future unless we have a good idea of the current impact of what we do.
- The involvement of our whole team in gathering data would increase environmental awareness and allow us to scrutinise our work more closely, and make decisions about how we can improve our environmental credentials in future.

A Doll's House was a much larger production than *A Little Voice* in many ways. It had more artists and technicians participating, more resources being used and, of course, more audiences watching the show. We have tried to record data from all possible aspects of the production that could cause CO2 emissions. We have also tried to keep a record of all other resources that were used in the production and performance process.

The methodologies we have used to make our calculations are very similar to the ones we used last year. Once again we used the templates developed by *Tyndall Centre* and *FutureEverything*. But we've also brought in some new measuring tools to calculate the carbon footprint. These tools have been developed since last year, in particular the green theatre tool created by *Julie's Bicycle*. This has allowed us to make calculations which are much more precise and industry specific. However, there is still no single tool to make this kind of calculation meaning that from time to time we have discovered gaps that we have not been able to solve with the tools that we have had available to us. Whenever we feel that there have been particular flaws in our calculation we have flagged them up and, where possible, have shared the solutions that we came up with.

The Set

The set, designed by Judith Croft, was a spare suggestion of a late nineteenth century Norwegian drawing room with walls on three sides wrapped by three taller walls. The main material used in its construction was wood.

The construction of the set was outsourced to Liverpool Scenic Workshops instead of built in house. The team at Liverpool provided us with a material list from the workshop (see appendices for full list of materials used)

The materials used included:

31 tins of paint (approx 165 litres)
998 lengths of 70 x 22mm timber
36 sheets of 3.6mm flame retardant ply
108 litres of PVA
2200 screws.

- All timber from the set was recycled after use
- All props built by Liverpool scenic workshops were returned to stock.
- All ironmongery was returned to stock.
- The off cut waste materials from the builders that were not useable were sent to be recycled.
- Any useable off cut waste materials from sheets and timber were saved for reuse by the builders.
- The set was disposed of by Paul Matthew Transport Ltd at the recycle centre tip in Birkenhead. We have record of the exact proportion, if any, of the set that it was not possible to recycle.



Props

60 items (units) of props were sourced for this show (see appendices for full list of props). Apart from ready-to-use props that were purchased or borrowed, stage workers spent approximately 108 hours to make props especially for the show.

63% of the props were put in stock after the show.

12% were returned to where they were borrowed from.

8% were recycled.

7% were put as wastage, including burnt candles and torn-up parcels. It was noted that some of the paper wastage could have been recycled but was thrown away instead. The remaining 8% of the props were consumable goods such as food and cigars.



Lighting and Sound

All of the lighting and sound equipment that was used was either from the Library Theatre or from the Lowry.

Since the Lowry doesn't have a separate meter for electricity consumption in the theatre where the show was on, there was no way we could get the exact

measurement of electricity usage. Also different lights were on for different periods of the show and not all equipment was on at full power all the time making it difficult to make an estimation of how much was being used. All of this meant it was impossible to make an entirely accurate measurement.

For this reason the carbon footprint of lighting use during the production could only be estimated by using the *Green Theatre Calculator* that was created by the *Theatres Trust* as part of London's Green Theatre Initiative. On this basis it is recognised that the final figure is an estimation and may not be as accurate as we had hoped.

There were 17 items of sound equipment and 116 lanterns used in the performance. All of them were put back into stock after the show.

All the batteries used for the performance were recycled at a battery collecting point.

Costume

There were 115 pieces of costumes used to dress the 13 members of the cast.

Of these 50% were taken from the Library Theatre's stock, 46% were hired and 4% tailor-made for the show. 3 staff worked about 160 hours to make the costumes. Although a record was kept of how many costumes were made no record was kept of the materials that were used.

All costumes that were hired were returned after the show, and items made or taken from the stock were put back into stock.

19 items of costumes were washed and dried after every performance to ensure they remained in good condition. Washing machines and dryers were used for about 72 hours in all during the show.

We were not able to measure the exact electricity usage for the machines that were used. Instead the carbon emissions of **26.9kg** of CO₂ was estimated using standard tools provided on <http://www.carbonfootprint.com>. We were also unable to measure the amount of water that was used in laundering costumes.

61 pieces of costumes were dry-cleaned after the show. We don't have the make and type of the appliance used, therefore data on the emissions caused by this is not known.



Marketing and Publicity

A variety of marketing materials were used for *A Doll's House*, including 35000 A5 fliers, 1300 programmes, 250 A3 posters, 10 Double Crown posters and 5 sheet posters.

All fliers and posters were printed on recycled paper.

There were about 300 programmes left at the end of the show – these were recycled. Any leftover fliers or posters were also recycled.

Again, we used *The Green Theatre Calculator* to work out the carbon emissions that would be caused from producing this print. It was also noted that we currently have no way of knowing or following up how much print that is distributed to partners, such as The Lowry, remains unused. This figure also makes no consideration of the environmental impact of the different methods of distribution that was used for the 35,000 fliers that were produced.

It is currently impossible to measure the environmental footprint of our online marketing activities.

Audition, Rehearsal and Performance Space

The CO2 emissions were mostly caused by the lighting and heating of the spaces, as well as electrical equipment that was used such as sound equipment. On this basis the amount of emissions can vary significantly for the different venues and spaces that we used.

We used the template developed by *Tyndall Centre* to calculate the CO2 emissions for different spaces that we used with slightly adjusted calculating formulas to make it suitable for the spaces we were using.

The auditions took place over eight different sessions over 36 hours, causing 152kg of CO2.

All the off-stage rehearsals took place in the studio of *Zion Arts Centre*. In addition to this there was one technical rehearsal and two dress rehearsals on stage at *The Lowry*. In total there were 142.25 hrs and 13.5 hrs of rehearsal respectively. This caused total emissions of 1440.86kg of CO₂.

The crew also spent 47.5 hours on stage during performances / rehearsals, which caused 12,820.79 kg of CO₂, including the work done in the dressing rooms and backstage.

The FOH areas were estimated to have caused another 1486.17kg of CO₂. However, it was difficult to calculate this figure accurately in a large, multi-use space like *The Lowry*.

Travel

Staff Travel

Travel was the cause of a large proportion of the CO₂ emissions for the show. We tried to record the distance and method of transport for each journey related to the show. In order to make this large amount of data more manageable we broke it into four different sectors: auditions, off-stage rehearsals, preparations and tech-week (including performances).

Auditions – The cast included actors from all over the country. In order to find the cast we held a total of 8 auditions - 4 of them took place in London and 4 of them in Manchester. There were 93 return journeys made by both staff from the theatre and artists in order to attend auditions.

Off-stage rehearsals – The crew spent 23 days of rehearsals at the Zion Arts Centre in Hulme. 219 return journeys were made by artists and technicians who were involved in these sessions.

Preparations – Staff from stage management, construction and design, wardrobe, LX and Sound and marketing made 155 journeys sourcing materials and promoting the show.

Tech-Week & Performances – After the show was moved to the Lowry, there were another 196 journeys made by the staff and the artists.

In conclusion, staff from the Library Theatre and all the artists participated took 663 return journeys to be able to present *A Doll's House* to their audiences.

We used multiple tools to calculate the CO₂ emission to make sure the outcome was as accurate as possible. That included the template created by the *Tyndall Centre* and *FutureEverything*, as well as the tool from *Transport Direct*. However there could still be flaws – the calculation is only ever as good as the data that is provided and at times there were inconsistencies in the data that was being recorded. We are looking forward to developing more efficient ways of recording the travel information in future projects.

The total travel of staff and artists caused **2658.9kg** of CO2 emissions.



Audience Travel

How audience travelled to the Lowry to watch the show and how far they travelled was a large contributor to total CO2 emissions. There were also big challenges in collecting this data – when we did our work on *Little Voice* we asked the audience about travel when they booked the tickets. The questions we asked were:.

- How do you plan to travel to the theatre?
- How many people will you be travelling with?

The aim was to sample a statistically representative sample of the audience (approx 20%) as well as getting a feel for how many people shared journeys and travelled in groups, thus cutting carbon emissions. However, this aspiration did not go to plan...

At present we sell tickets through *Quay Tickets* at *The Lowry* who were unable to collect this data when bookings were made. Instead we had to rely on the results of an online survey conducted after the show was over. We had an audience of just over 6083 and only got data from 120 of these about travel. This is not a representative sample. Also, the phrasing of the questions within this online survey meant it was impossible to get a feeling of how many people travelled to the show in groups rather than as individuals. This was a definite weakness and means that the figures we are able to provide can not be guaranteed in their accuracy.

In total 6083 people came to watch *A Doll's House*, over 19 performances.

According to the sample we received:

77.8% of the audience travelled by car.

17.6% of the audience travelled by tram.

2% of the audience travelled by bus.

2% of the audience walked to watch the performance.

0.7% of the audience travelled by bike.

The average travel distance for audience members who were sampled to watch the show was 18.56 miles (or 37.12 miles for their return journey). This gave a total travel distance for the audience of 25782.40 miles. As mentioned earlier, it should be noted that this distance is estimated on individual travel instances even though it is likely that a large proportion of the audience probably travelled in groups by car; this should have been counted as one journey rather than multiplied. If it had been possible to do this it is likely that actual amount of travel would be less than the amount we've estimated.

Total Carbon Dioxide Emissions

		CO2 Emission (kg)	Percentage of Total
Audition	Travel	310.4	1.00%
	Space	152.13	0.49%
Offstage Rehearsal	Travel	622.9	2.00%
	Space	902.17	2.90%
Preparation	Travel	643.7	2.07%
	Materials	758	2.45%
Tech Week & Performance	Travel	81.9	0.26%
	Stage Rehearsal Space	538.69	1.73%
	Performance (incl. backstage)	12820.79	41.25%
	FOH	1486.17	4.78%
Audience	Travel	11858	38.15%
Other	Outsourcing Labours	181	0.58%
	Washing & Drying of Costumes	26.9	0.09%
	Wastes	700	2.25%
Total Emission		31082.75	100%
Total Attendee		6083	
Average Emission Per Ticket Sold		5.11	



Conclusion

The carbon footprint for the whole show was just over 31 tonnes. This equates as...

- The equivalent of 31 return flights from London to New York.
- The equivalent of the yearly carbon footprint for 3 individuals in the UK.
- The equivalent of the yearly carbon footprint for 310 individuals in Laos.

However, as over 6000 people watching show the carbon footprint per ticket sold was only 5.11kg (or 0.0051 tonnes!). This is the same as:

- 64 packets of *Walkers* Cheese and Onion Crisps.
- 2.5 *Marks and Spencers* Bras
- 1.7 *McDonalds* Hamburgers

We are proud to say that the Library Theatre is one of the first theatres in the North West to go to the effort of measuring the environmental impact of our work. The approaches we've taken are certainly experimental in many ways but, as the field grows the tools that are available to us will improve so we have the belief that we will be able to continue improving the accuracy of our calculations in coming years. Areas where we noticed particular weakness and challenges were:

- It was impossible to measure the electricity usage for the theatre space at *The Lowry* meaning that we had to make estimations based upon the number of lights that were being used. Although there is little we can do about this in that space it raises interesting questions for our new home- should it be possible to get metre readings for each different space and different areas in the building so it is possible to measure the specific electricity use for different projects, exhibitions, performances...etc...

- In some cases the information that has been collected does not provide sufficient information to get a full picture of what is going on. We mentioned the challenges gathering data about audience travel. Another good example is with costume – although we have recorded how many costumes were made there is no data about what was used to make them, if any waste was produced as a result of the process and what was done to dispose of any waste.
- We were unable to record the electricity and water used in laundering costumes. Again, there is little that we can do about this in our present circumstances but it would be good to be able to do this in our new home and may be an interesting factor to influence how the wardrobe space is designed in the new home.
- We had a large number of items dry cleaned after the show but have no data about the environmental footprint of this. As this is potentially a very damaging process it would be good to know its impact and ensure that we are using the method that is currently most environmentally friendly.
- We distribute large amounts of print to various sources but do not currently trace how much of that remains unused after the show and what happens to any waste that exists. It would be good to consider methodologies of doing this – again this would be simpler when we move to our new home.
- The data we used can only ever be as accurate as the data that was provided by the team. For example, most people were very good at signing in when they came into reception and making a record of how they had travelled. But teams were not so good at recording data about additional journeys that were made during the course of the day related to the show. This is clearly a gap in data that it is impossible for us to include in final calculations. This is a great illustration of the fact that all members of the team need to be fully engaged in a project of this scale to make it happen!

One of the main challenges for us this year is the fact that the Library Theatre Company moved out from the basement of Central Library to a temporary home in *Zion Arts Centre* in Hulme staging work at *The Lowry* in Salford.. This means we have limited access to some of the critical information and had to rely on our partners to provide reference. However, despite these challenges we feel that this has been a worthwhile exercise that we intend to repeat at least once each season.

The key organisational outcomes of the project have been:

- Increased understanding of the environmental impact of the work that we do.
- Increased awareness of what we do well and how we can improve upon this. For example, we already recycle the majority of our waste, though in future may consider how the amount of waste we produce can be decreased.
- Increased awareness of where we do less well and consideration of how we can use these weaknesses to inform our Sustainability Action plan.

- Increased engagement of staff in company sustainability in the longer term inspired through direct engagement in this project.
- Development of new, greater “green aspirations” for the company.

The key plans as a result of this project:

- Development of a sustainability policy and action plan for the company which will underpin all our work.
- Development of a sustainability working group who meet every two months and drive forward sustainability issues in all of our work and look at setting realistic targets to work towards that will improve the environmental sustainability of the work that we do.
- To consider ways that environmental efficiency and sustainability can be a key factor within our new home / organisation as it develops.
- To undertake a study like this on at least one more of our shows in the next twelve months.
- To investigate BS8901 Sustainable Events Management system and see how it can support the work that we are doing around sustainable practices.

Reference and Useful Links

Transport Direct <http://www.transportdirect.info>

Carbon Footprint <http://www.carbonfootprint.com>

Julie’s Bicycle – Green Theatre Calculator <http://www.juliesbicycle.com/>

Futureeverything <http://www.futureeverything.org/>

Manchester Green City Team
<http://www.manchester.gov.uk/manchestergreencity>

Library Theatre Company <http://www.librarytheatre.com/>