Julie's Bicycle
SUSTAINING CREATIVITY

FIT FOR THE FUTURE: INVESTING IN ENVIRONMENTALLY SUSTAINABLE BUILDINGS

A GUIDE FOR THE ARTS

ARTS COUNCIL ENGLAND

Contents

Foreword

We are at a pivotal moment in history. Faced with unprecedented ecological crises and a growing realisation that we are living beyond limits which our planet can support, there can be no doubt that the time to act is now.

There are many positive signs that momentum is building; the green economy is slowly transforming our global energy infrastructure; the trend from the investment community to divest from fossil fuels is gathering pace; and more and more voices are speaking out. There are real indications that countries around the world are gearing up to reach a meaningful and binding agreement to reduce greenhouse gas emissions during COP21, the 21st United Nations Conference on Climate Change, which takes place in December this year.

Over the last few years the arts in England have demonstrated increasing levels of understanding on environmental sustainability and climate change and started to take real and concerted action. Many have already understood the financial and reputational benefits of taking action and the implications of failing to act. There is an emergent vision and desire to lead change in this area. Those who are leading have also recognised the value of culture and cultural buildings in catalysing environmental change, not least through the role they play with artists, audiences and communities.

Arts Council England has played a pivotal role in creating the momentum for environmental change within the arts sector, notably with the introduction of its environmental reporting programme for revenue funded organisations in 2012, a programme in partnership with Julie's Bicycle. The 2015-2018 capital grants programme is a key strategic funding programme to address Arts Council England's goal of **"arts, museums and libraries which are resilient and environmentally sustainable".**

The role of capital investment in creating more resilient and environmentally sustainable organisations is one of the priority areas for Julie's Bicycle's 2015-2018 partnership with Arts Council England, and this guide is one of the first key actions in this area.

Over the last seven years, Julie's Bicycle has been gathering evidence and data on how the arts in England are embedding environmental sustainability into their operations, business models, governance structures and work with audiences, art and artists. This guide and, in particular, the many inspiring case studies it brings together, is the beginning of a better understanding and evidence base on the positive contribution which investing in more sustainable buildings can make to the environmental, financial, social and cultural sustainability of the arts. It tells an exciting story of change for the better and resilience, a story which we will continue to develop and tell.

Alison Tickell, Director, Julie's Bicycle

4 Understanding, evaluating and monitoring environmental performance

4.1 Understanding and evaluating performance

Whether investing in new plant and equipment, or undertaking major refit and refurbishments or redevelopment, you need a good understanding of your building's environmental performance. This knowledge will enable you to define clear and explicit performance outcomes, targets and indicators and determine a baseline against which to measure environmental performance of the building in use. Evaluating building performance after project completion will enable you to assess the extent to which outcomes and targets have been realised and identify changes or fine-tuning needed.

There is a range of methods. Choose the ones that work best for you, for example:

- **A review of existing behavioural and procedural measures** can identify non-technology interventions.
- **Building user interviews and surveys** determine what people think and how they feel about a building and how it meets their needs.
- **Energy surveys** are a systematic review of how energy is used within a building, from a walk through to an investment grade level survey by an experienced professional.
- **Infrared thermographic surveys** identify key areas of the building fabric to be prioritised for improvement and provide a baseline for comparing performance post works.
- **Air leakage testing** assesses the value of including draught-proofing improvements as part of a retrofit and gives a baseline for comparing results afterwards.
- **A Building Performance evaluation (BPE)**, generally done after project completion, evaluates how well performance objectives have been realised and how well the built environment satisfies the needs of the users, owners and managers. It will include building user surveys and at least some of the other methods listed above. The BPE method can also be applied in project inception.

Post-occupancy **building performance evaluations** (BPE) are an integral part of the Soft Landings approach. They involve measuring and comparing a building's as-constructed or in-use performance with its intended designed performance or industry benchmarks. The real performance can turn out to be better or worse than the designer intended or compared to benchmarks. This difference is known as the '**performance gap**'. BPE unpicks the reasons why and how improvements can be made.

- Institute for Sustainability's online Guide to Building Performance Evaluation including questionnaires for user surveys and guidance on infrared thermography, U-value testing and air leakage testing
- Chartered Institute of Building Service Engineers TM22 Energy Assessment and Reporting Methodology
- CarbonBuzz tool for benchmarking and tracking energy use in projects from design to operation
- Carbon Trust Energy Survey Guide
- Arup's Museums and Art Galleries Survival Strategies: A guide for reducing operating costs and improving sustainability
- Building User Survey Methodology
- Soft Landings an initiative of BRSIA (Building Services Research and Information Association) and the Usable Buildings Trust

4.2 Environmental goals, targets and indicators

There is no 'one size fits all' approach for defining environmental ambitions, targets, goals etc. for buildings. In general though, they should cover environmental issues in design and construction and the building in use – notably energy, materials, water and waste. When setting targets and defining indicators refer to:

- **target emissions reductions** if they have been defined for your project under building regulations, see **Section 2.2 Building policy and regulations;**
- **regional or local environmental targets,** even if not mandatory, they can be a useful point of reference and;
- **sector benchmarks**, see **Section 4.3 Benchmarks.**

Goal/ambition: to be a low carbon building and become more energy self-sufficient		
Targets: • to reduce the building carbon footprint by 10% (comparing the year preceding the capital project and the year after completion) • to source 25% of building energy from on-site renewable generation	**Indicators:** • kg of carbon dioxide equivalent per m^2 floor area per year (based on electricity and gas use) • % of total energy use generated by on-site renewable sources per year	**Implementation strategy** (developed over the design process) • introduce passive cooling via natural ventilation • install energy efficient boiler • install LED lighting and lighting controls • install solar thermal panels for hot water heating • energy management training for the facilities team
Goal/ambition: to maximise the use of sustainable construction materials		
Targets: • reuse as many of the original building materials as possible in the refurbishment • achieve 100% FSC certified timber	**Indicators:** • % of construction materials which were reclaimed (tonnes of reclaimed construction materials / total tonnes of construction materials) • % of FSC timber used (tonnes FSC certified timber used / total tonnes of timber used)	**Implementation strategy:** • reclaim bricks from the demolished areas of the building • reuse timber flooring for desks • inclusion of sustainable sourcing requirements in the construction contract

Table 1. Examples of environmental goals, targets and indicators

Include ambitions, targets and indicators in the project brief and, where relevant, contractual obligations. Review them regularly throughout the project. Are they still valid or do they need adjusting? Can new ones be set in light of new information on low or zero carbon technologies? Evaluate the extent to which they have been realised upon completion.

- Better Buildings Partnership's Sustainability Benchmarking Toolkit for Commercial Buildings
- The 2014 technical manuals for BREEAM UK Non-Domestic Refurbishment and Fit-Out and BREEAM UK New Construction including Key Performance Indicators In Use

[space]

SPACE runs 18 artist studio buildings across seven London boroughs, providing affordable creative workspace for over 700 artists and professional development support for a further 700. It is committed to environmental, economic and social sustainability. SPACE's Operations Director has overall responsibility for its environmental policy and each studio building has an environmental champion.

Measures undertaken before its capital project included installing solar photovoltaic panels at Haymerle Road, a measure which has already generated about £18,000 of new revenue.

Over the last few years, SPACE invested in a **refurbishment of four of its buildings** (two freeholds and two leaseholds) – Deborah House, The Triangle, Haymerle Road and Martello Street. The **total project cost was £3.24 million**. £1.26 million was provided through Arts Council England. The remaining £1.98 million came from a range of sources, including a private donation of £180,000 and loan funding from the ethical bank Triodos of £512,000.

The project's aims were to:

- **ensure the sustainability of artistic practice in London by improving working conditions for the artists**, in particular enabling artists to use studios through the winter which was previously very challenging.
- **increase the life of its buildings** in the long-term and;
- **reduce energy and running costs**.

In the course of the project, SPACE found a **significant overlap between environmental and artists' needs**, bringing environmental sustainability into the heart of the project. In addition, as the works took place while the buildings were occupied, good communication and planning in co-operation with the artists was essential.

SPACE was **supported throughout the project by professional advisors and experienced contractors** with whom it had an established working relationship, in particular: Sarah Wigglesworth Architects, an architectural practice with a proven environmental track record, and; Michael Pawlyn of Exploration Architecture, a proponent of learning from nature to transform architecture and society. Construction began in November 2013 and was completed in January 2015. The construction contractor had its own environmental policy and waste management plan.

One of the main aims of the redevelopment was to **improve the buildings' thermal performance and increase the buildings' life span**, which it did via **insulation, notably re-roofing, cladding and double glazing and the use of durable materials**.

At Deborah House the refurbishment included recladding, insulating external walls, double glazing and installing a **green roof. A gas central heating system** was installed at Deborah House and Haymerle Road, replacing the ad hoc use of inefficient electrical heaters. At The Triangle all **windows were draught-proofed and the heating pipes lagged** to reduce heating costs. Low wattage **LED lights on PIRS** (passive infrared sensors) were installed in communal areas and studio lights are low energy 46W T5 strip lights.

While it is early days yet, SPACE is confident that the refurbished workspaces will help to sustain its future and that of the artists it supports. It has already had positive informal feedback from the occupiers and will be doing a formal building user survey. They have seen **signi icant reductions in U-values, a measure of thermal performance** and will be collecting and analysing meter readings on a quarterly basis, comparing before and after the refurbishment to establish energy performance improvements and examine emerging trends. Gas heating systems will be regularly reviewed to ensure that they are working at optimum levels. It will also review settings for each building following a settling in period. Given the anticipated life spans of the materials used it **expects savings of about £50,000 a year in maintenance costs** over the next twenty years which will help compensate for increased rental costs.

4.3 Benchmarks

When setting performance targets and indicators, evaluating outcomes and monitoring the building in use, refer to existing industry benchmarks such as Julie's Bicycle energy and water benchmarks and the Chartered Institution of Building Engineers (CIBSE) TM46 Energy Benchmarks.

Julie's Bicycle energy and water benchmarks

CIBSE TM46 energy benchmarks

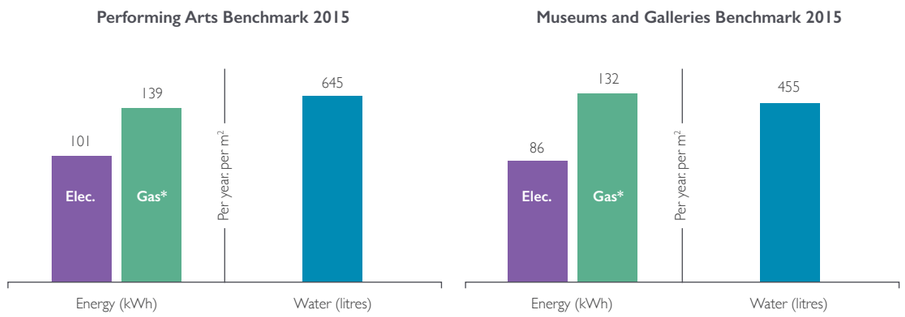

Figure 5. Julie's Bicycle Energy and Water Benchmarks

Building type	Entertainment Halls CIBSE TM46 (kWh/m2/year)		Performing Arts Buildings Julie's Bicycle 2013/14 (kWh/m2/year)		Cultural Activities CIBSE TM46 (kWh/m2/year)		Museums & Gallery Buildings Julie's Bicycle 2013/14 (kWh/m2/year)	
Energy type	Electricity	Gas	Electricity	Gas	Electricity	Gas	Electricity	Gas
Median kWh/m2/year	Na	Na	100	131	Na	Na	81	134

Table 2. Comparison of CIBSE and Julie's Bicycle Energy Performance Benchmarks

4.4 Monitoring environmental performance in use

Define clear responsibilities for monitoring the environmental performance and impacts of your building in use. Make sure the people responsible understand why this is being done and have the necessary knowledge and training.

Monitoring in itself will not generate improvements. The information it generates should be used in a timely way by the right people (discovering a major peak in energy use a year after the event may not be helpful). On-going and regular monitoring will enable you to see how you are doing over time and make the link between your actions and performance and also better communicate with your staff, audience etc.

- Arup's Museums and Art Galleries Survival Strategies: A guide for Reducing Operating Costs and Improving Sustainability
- Carbon Trust Monitoring and Targeting guide
- Julie's Bicycle Industry Green Tool - carbon calculator for venues

ARTS ADMIN.

Artsadmin is a unique producing and presenting organisation for contemporary artists working in theatre, dance, live art, visual arts and mixed media. In 2014, Artsadmin installed 40 **solar photovoltaic panels** onto the roof of Toynbee Studios in London. This was a self-funded project with an estimated ten-year payback period. The panels have generated 9.4 MWh of energy since 2014, saving 5.4 tonnes of carbon and £1,184 so far. **Energy use is communicated to visitors through digital displays** in the foyers of the building. **Power and water are measured on a monthly basis** and building users are actively encouraged to switch off energy and water using devices and equipment. Between 2013 and 2015, Artsadmin have seen a **50 per cent** reduction in water use based entirely on staff efforts.

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About Julie's Bicycle

Julie's Bicycle is the leading global charity bridging the gap between environmental sustainability and the creative industries. Our aim is a creative community with sustainability at its heart and our goal is to provide the inspiration, expertise and resources to make that happen.

Julie's Bicycle has an unmatched track record of research specific to arts and cultural activity, which underpins everything we do. Our team brings together environmental expertise, and experience of the arts and cultural sectors and our website constitutes the most comprehensive resource library developed specifically for the arts and culture anywhere in the world.

We work with over 1,000 cultural organisations across the UK and internationally, to help them measure, manage and reduce their environmental impacts. Over 2,000 companies, large and small use the Creative IG Tools, our suite of carbon calculators and our certification scheme is the recognised benchmark for sustainability achievement within the creative industries.

We believe the creative community are uniquely placed to lead and transform conversation around environmental sustainability and translate it into action.

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