

Going for Green

Chair

Chris Dumas, Avison Young

AECOM

**AVISON
YOUNG**

Bristow

BURO HAPPOLD

Paddy Dillon
Architect

Theatres Trust
Conference 21:
Making Theatre
Sustainable



#MakingTheatreSustainable

What is the “green state” of UK theatres?

What can we do about them?

Laia Carpena, Buro Happold

AECOM

**AVISON
YOUNG**

Bristow

BURO HAPPOLD

Paddy Dillon
Architect

Theatres Trust
Conference 21:
Making Theatre
Sustainable



#MakingTheatreSustainable

What is the state of UK Theatres with respect to sustainability?

- Site surveys, experience
- Published data
- Information from theatre representatives

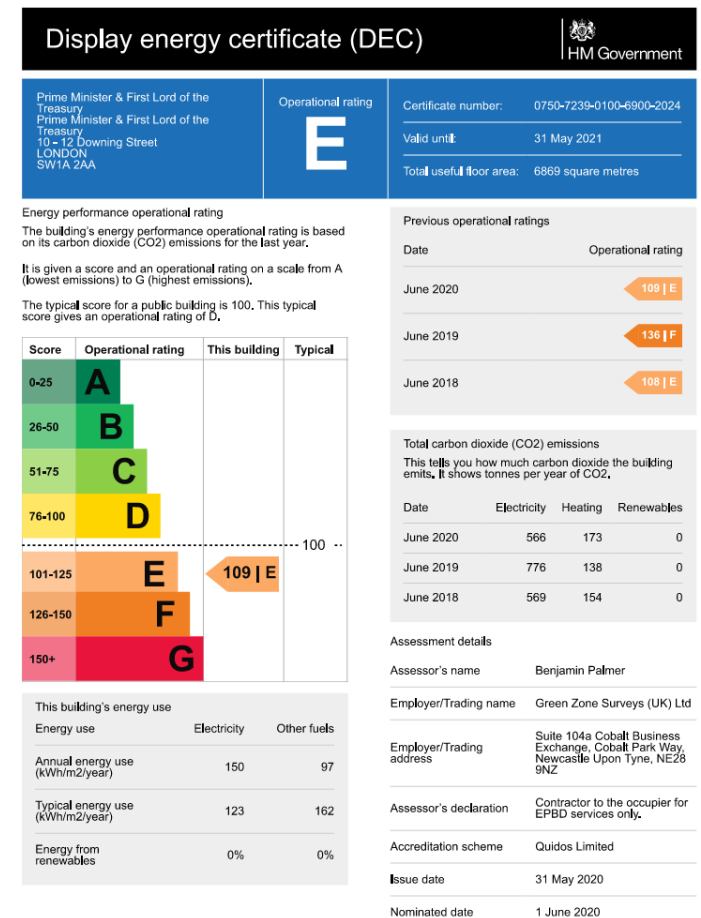
What do we observe from site surveys?

Common issues

- Energy loss through building fabric
- System inefficiencies, old plant
- Poor controls
- Non-detailed metering

If we look at published data...

- Required for buildings over 250m² occupied by public authority.
- Based on measured energy use.
- Metrics include building area and operating hours.



What do the DECs tell us?

There is currently a limited number of published display energy certificates.

However, there are valuable metrics we can extract from them.

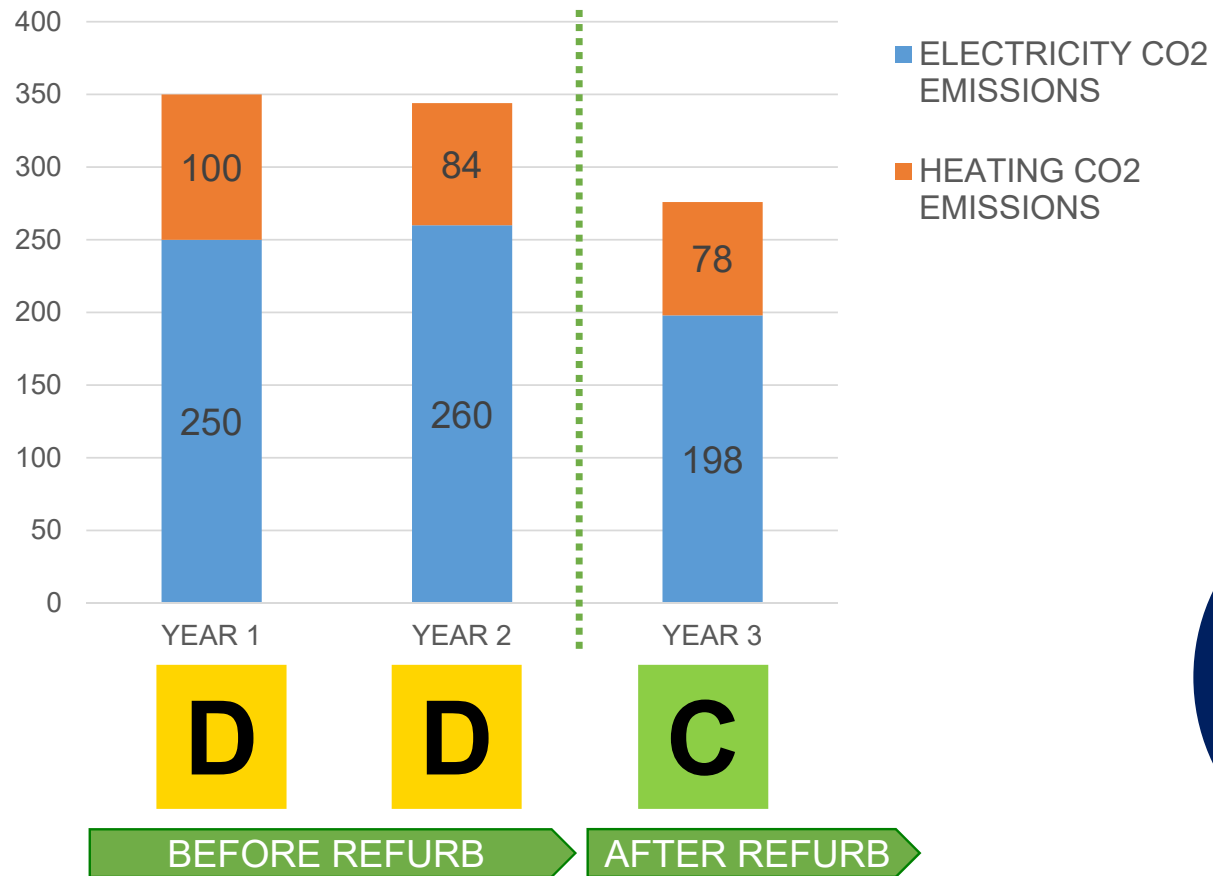


Rating isn't everything...

If we “zoom in” to study an example from published data:

- Around 500 seats.
- Refurbished since first published DEC.

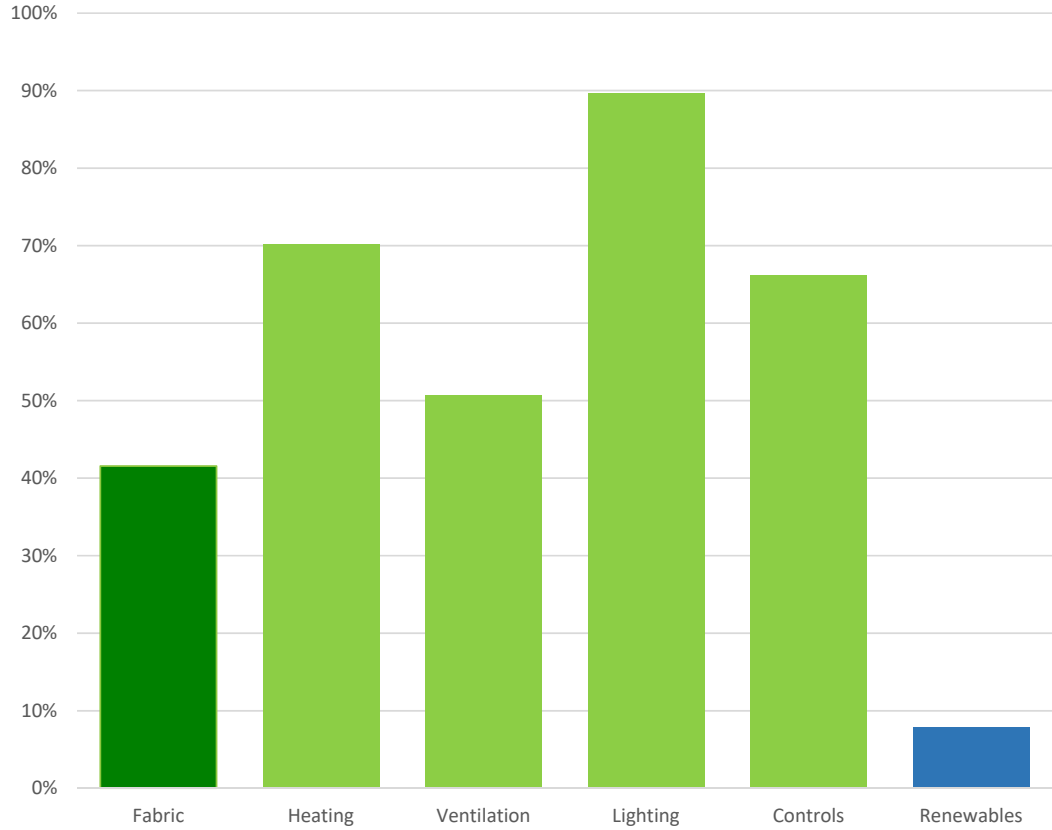
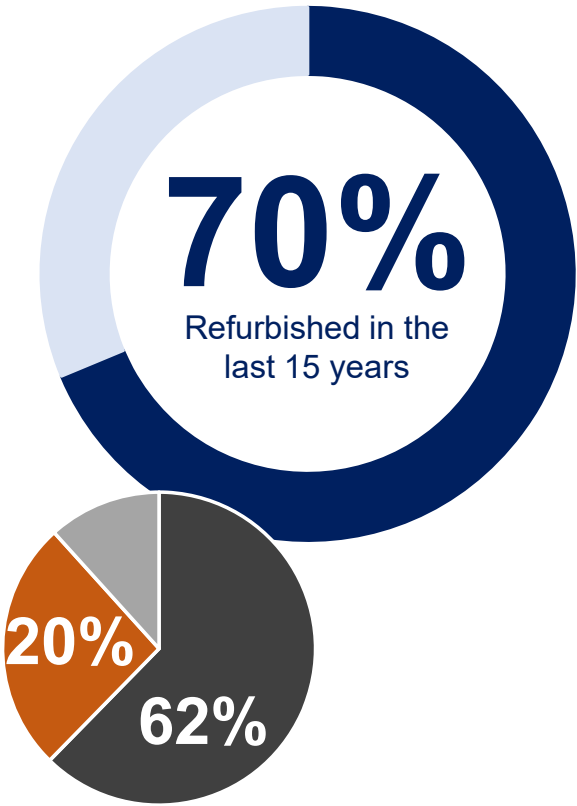
Case Study

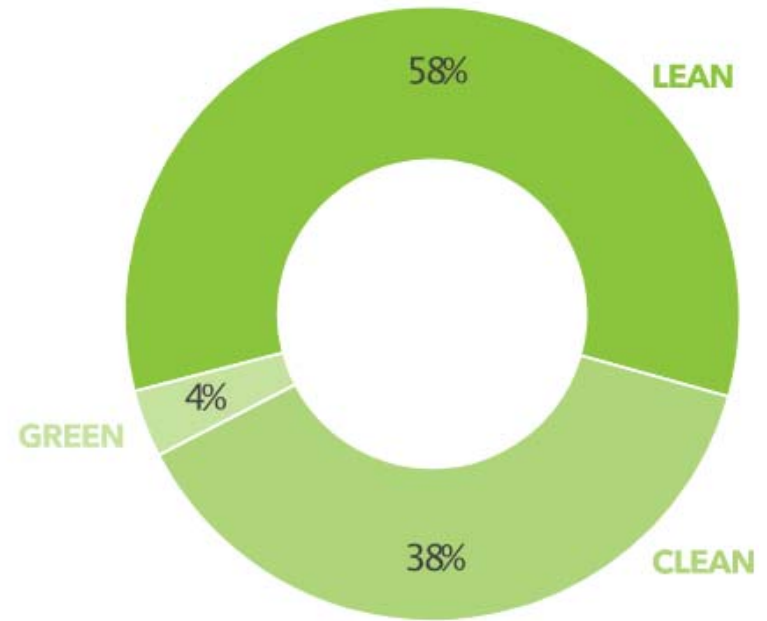
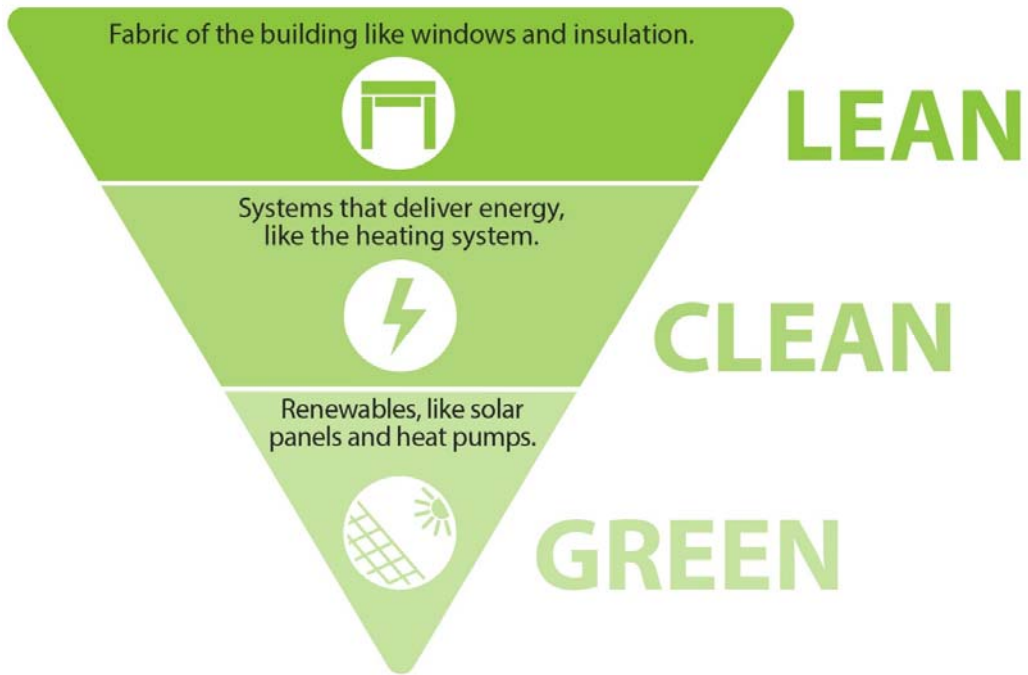


74
tonnes
CO₂/yr

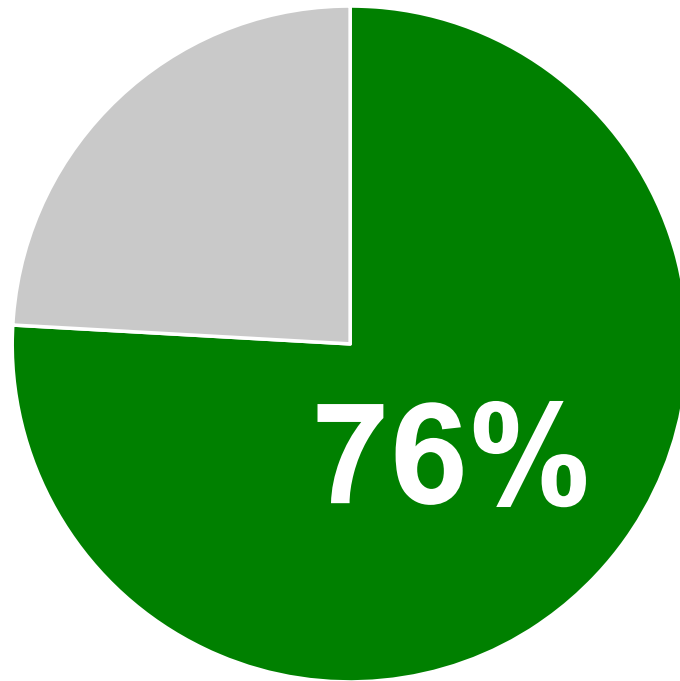
21%
improvement

We asked you...





Now is the time



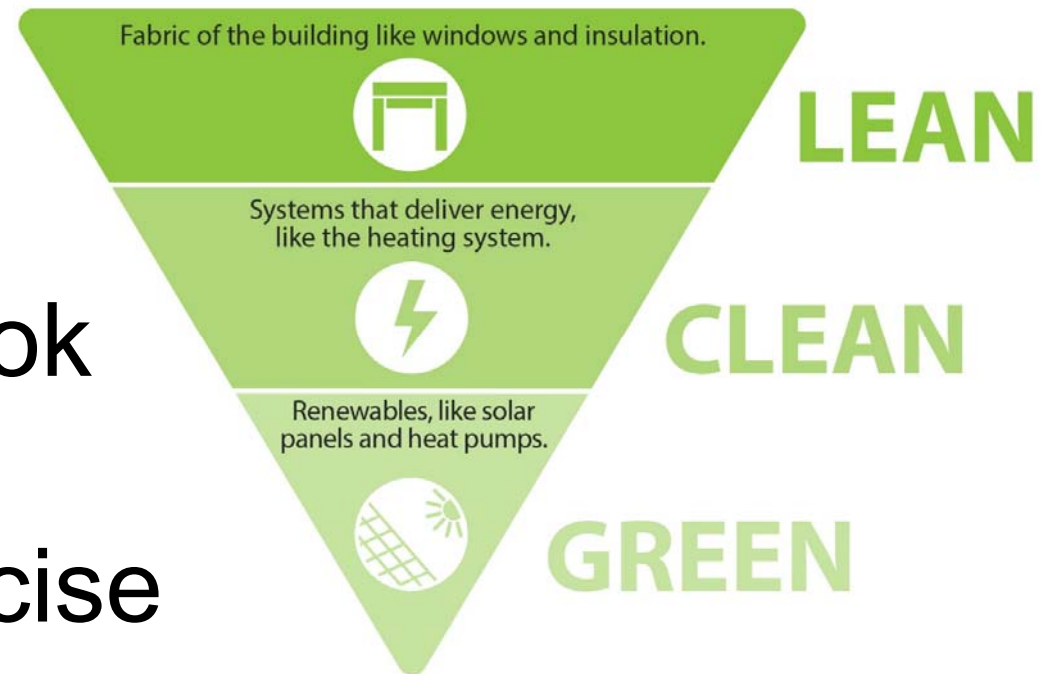
Plan to carry out
a refurbishment in
the next 5 years.

What do we need to do?

| Item ID | Item Name | Category | Priority | Status | Owner | Start Date | End Date | Dependencies | Comments | Notes | Assigned To | Progress % | Created At | Updated At |
|---------|----------------------------|---------------|----------|-------------|-------|------------|------------|--------------|---|---|-------------|------------|------------|------------|
| 1 | Project Kick-off | Initiation | High | Completed | J.Doe | 2023-01-01 | 2023-01-05 | | Initial meeting with stakeholders to define scope and objectives. | | Alice | 100% | 2023-01-01 | 2023-01-05 |
| 2 | Requirements Gathering | Analysis | High | In Progress | J.Doe | 2023-01-10 | 2023-02-15 | 1 | Collecting requirements from various departments. | Review requirements with stakeholders. | Bob | 75% | 2023-01-10 | 2023-02-10 |
| 3 | System Architecture Design | Design | Medium | Not Started | J.Doe | 2023-02-20 | 2023-03-31 | 2 | Designing the overall system architecture. | | Charlie | 0% | 2023-02-20 | 2023-02-20 |
| 4 | Database Design | Design | Medium | Not Started | J.Doe | 2023-02-25 | 2023-03-15 | 2,3 | Designing the database schema. | | Bob | 0% | 2023-02-25 | 2023-02-25 |
| 5 | Backend API Development | Development | High | In Progress | J.Doe | 2023-03-20 | 2023-05-10 | 3,4 | Developing the backend API endpoints. | Implement authentication and authorization. | Charlie | 60% | 2023-03-20 | 2023-05-05 |
| 6 | Frontend UI Development | Development | High | In Progress | J.Doe | 2023-03-20 | 2023-05-10 | 3,4 | Developing the frontend user interface. | Implement responsive design. | Alice | 65% | 2023-03-20 | 2023-05-05 |
| 7 | Integration Testing | Testing | Medium | Not Started | J.Doe | 2023-05-15 | 2023-06-01 | 5,6 | Testing the integration between components. | | Bob | 0% | 2023-05-15 | 2023-05-15 |
| 8 | Deployment | Deployment | High | Not Started | J.Doe | 2023-06-05 | 2023-06-10 | 7 | Deploying the application to production. | | Charlie | 0% | 2023-06-05 | 2023-06-05 |
| 9 | Post-deployment Review | Closure | Medium | Not Started | J.Doe | 2023-06-15 | 2023-06-30 | 8 | Reviewing the project outcomes and lessons learned. | | Alice | 0% | 2023-06-15 | 2023-06-15 |
| 10 | Documentation Update | Documentation | Medium | In Progress | J.Doe | 2023-06-20 | 2023-07-15 | | Updating project documentation. | | Bob | 40% | 2023-06-20 | 2023-07-10 |
| 11 | Project Handover | Closure | High | Not Started | J.Doe | 2023-07-20 | 2023-07-31 | | Handing over the project to the operations team. | | Charlie | 0% | 2023-07-20 | 2023-07-20 |
| 12 | Final Report | Documentation | Medium | Not Started | J.Doe | 2023-07-25 | 2023-07-31 | | Writing the final project report. | | Alice | 0% | 2023-07-25 | 2023-07-25 |

What do we need to do?

- ✓ Know where you are
- ✓ Follow the Green Book
- ✓ Measure, record, update, share & publicise



What will it cost?

Nav Kang, Bristow Consulting

Paul Davis, AECOM

AECOM

**AVISON
YOUNG**

Bristow

BURO HAPPOLD

Paddy Dillon
Architect

Theatres Trust
Conference 21:
Making Theatre
Sustainable

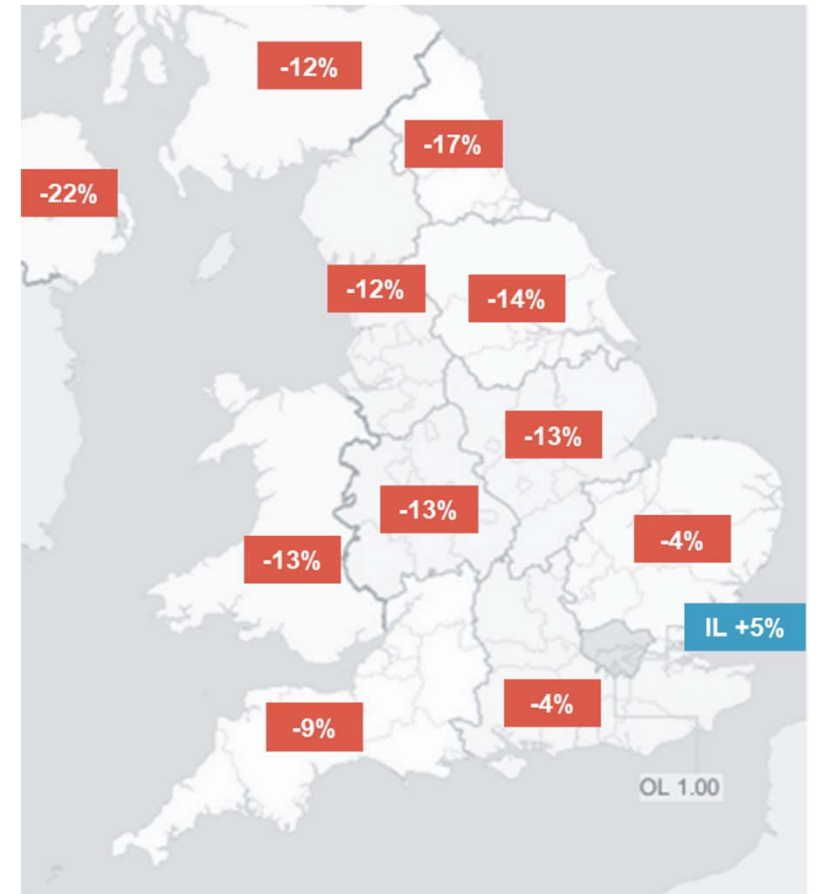
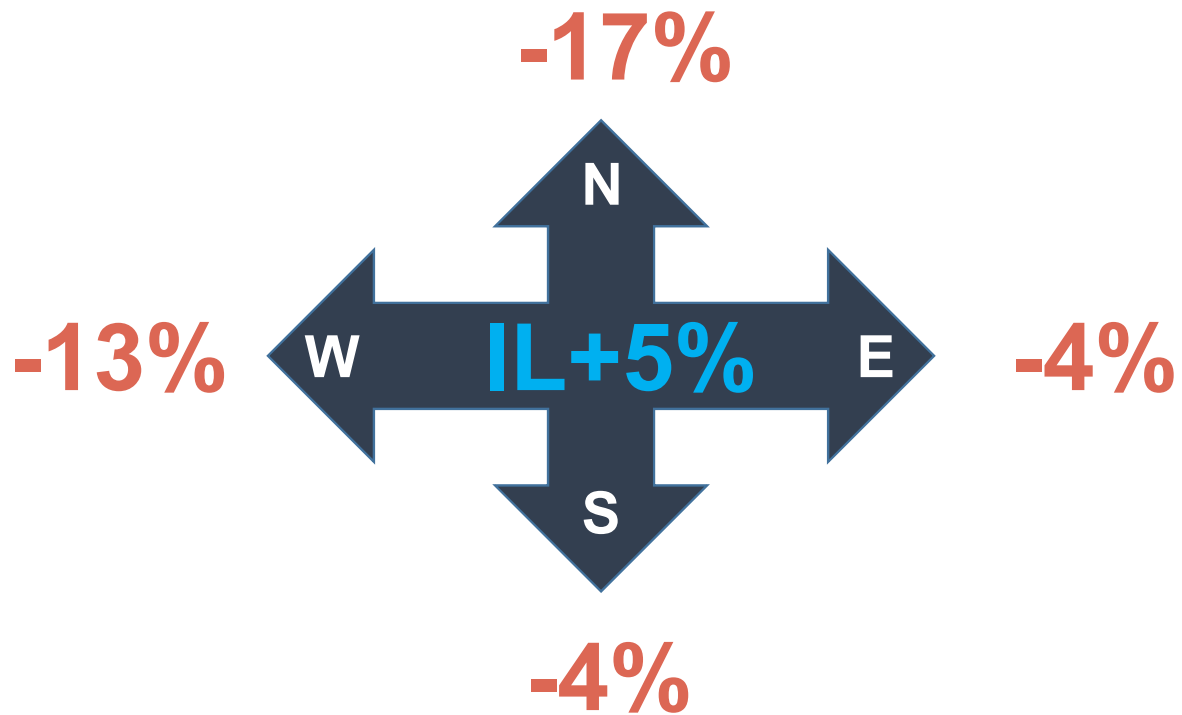


#MakingTheatreSustainable

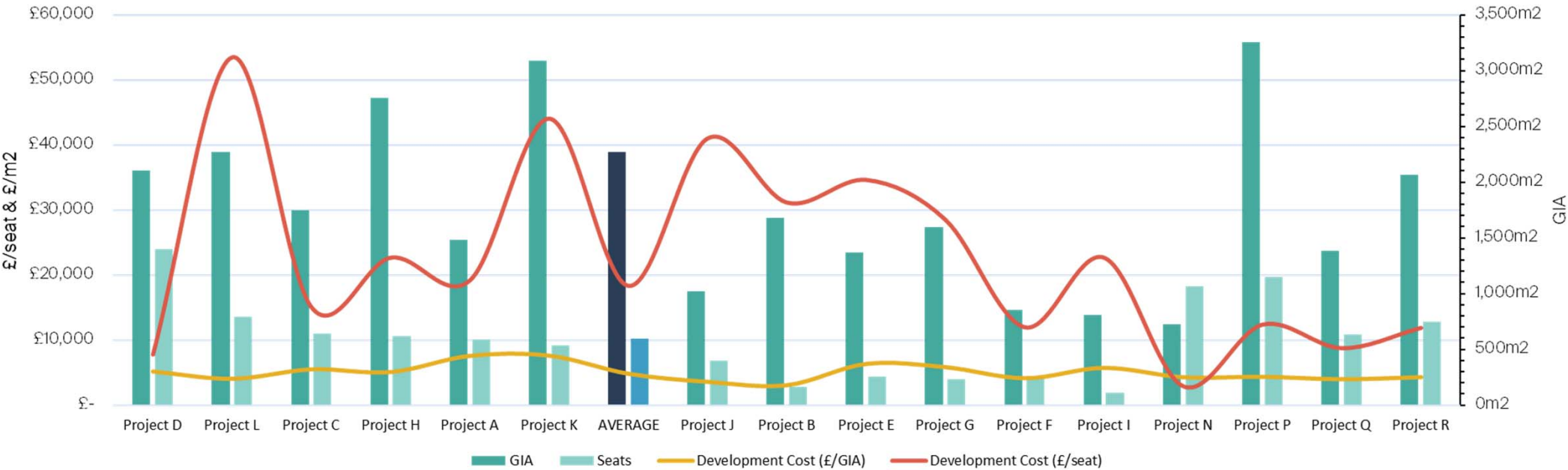
Benchmarking



Regional Variances



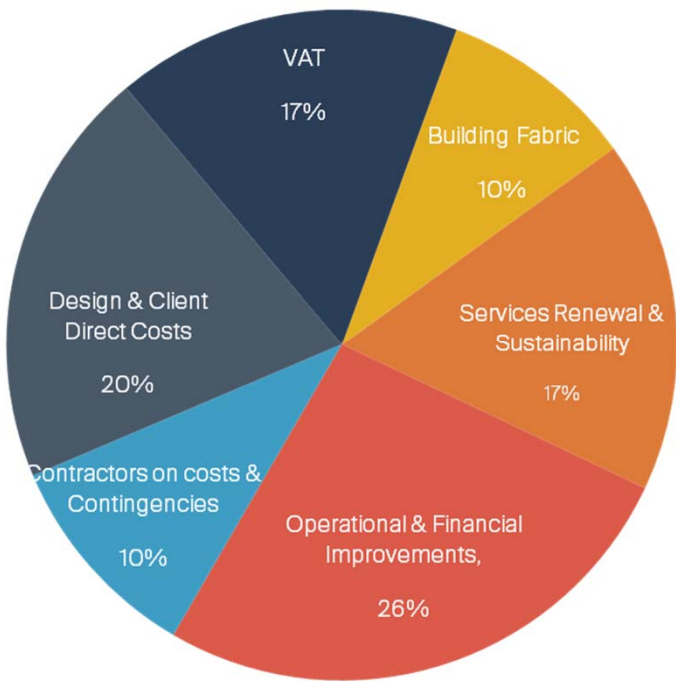
Theatre Refurbishment Projects Baselined to 4Q21 prices in Greater London



| Key Metrics | Range |
|------------------|-------------------------|
| Seating Capacity | 113 - 1400 |
| GIA (m2) | 805m2 - 10,374m2 |
| GIA (sqft) | 8-665sqft – 111,666sqft |
| Year Built | 1824 - 1977 |
| Age (Years) | 196yrs – 43yrs |

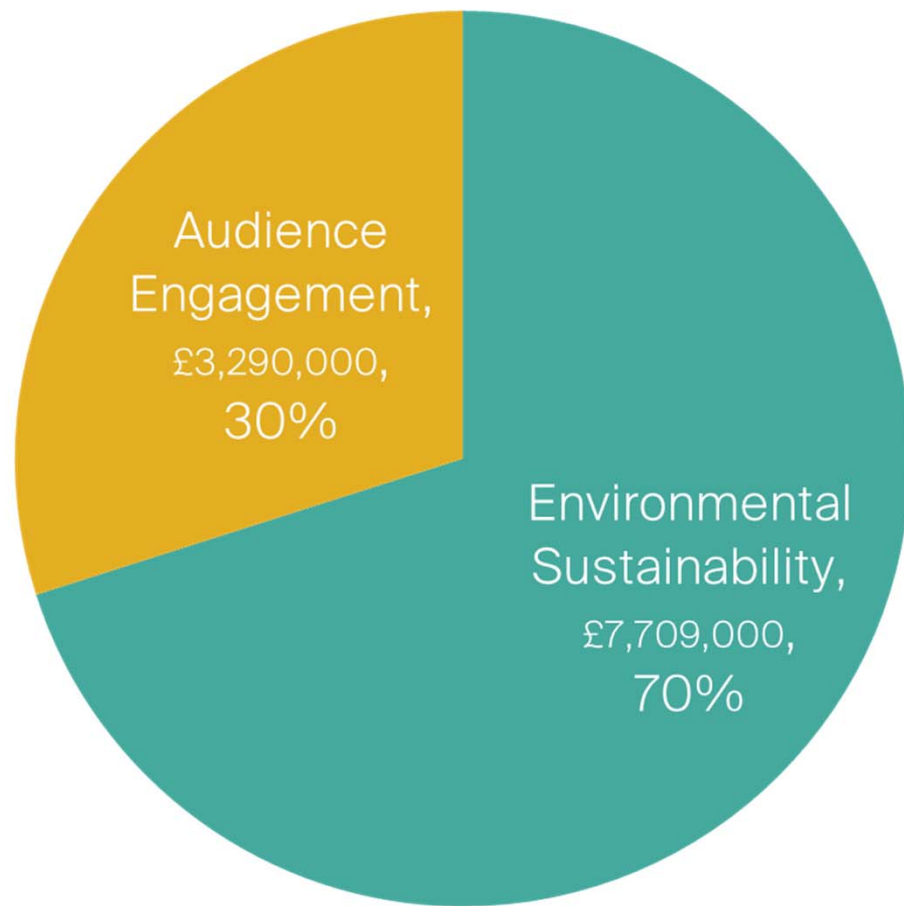


| Key Metrics | |
|------------------|------------|
| Seating Capacity | 599 |
| GIA (m2) | 2,268m2 |
| GIA (sqft) | 24,415sqft |
| Year Built | 1920 |
| Age (Years) | 101yrs |



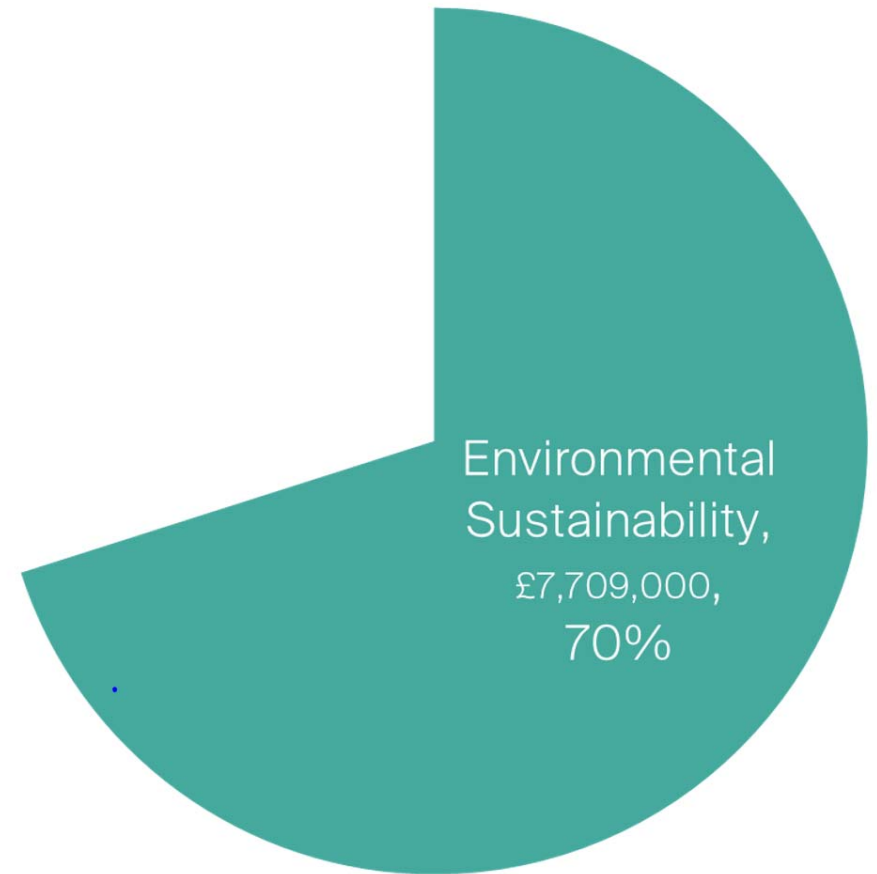
Full Carbon Reduction Implementation - Distribution of Development Costs

| REGION 12 GREATER LONDON | £ | £/m2 | £/seat | % of Development Cost | % of Construction Cost |
|---|--------------------|------------------|---------------------|-----------------------|------------------------|
| Building Fabric | £1,042,000 | £459/m2 | £1,741/seat | 9% | 15% |
| Services Renewal & Sustainability | £1,871,000 | £825/m2 | £3,125/seat | 17% | 27% |
| Operational & Financial Improvements <i>(including Accessibility, Entrance & Welcome, Foyer Renewal & Community Engagement)</i> | £2,897,000 | £1,277/m2 | £4,839/seat | 26% | 42% |
| Contractors on Costs & Risk | £1,126,000 | £496/m2 | £1,881/seat | 10% | 16% |
| Total Construction Cost | £6,936,000 | £3,058/m2 | £11,587/seat | 63% | 100% |
| Design & Client Direct Costs | £2,230,000 | £983/m2 | £3,725/seat | 20% | - |
| VAT | £1,833,000 | £808/m2 | £3,062/seat | 17% | - |
| Total Development Cost | £11,000,000 | £4,849/m2 | £18,374/seat | 100% | - |



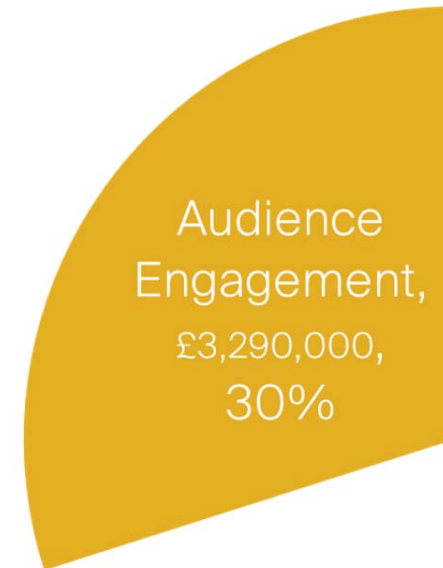
Sustainability Improvements

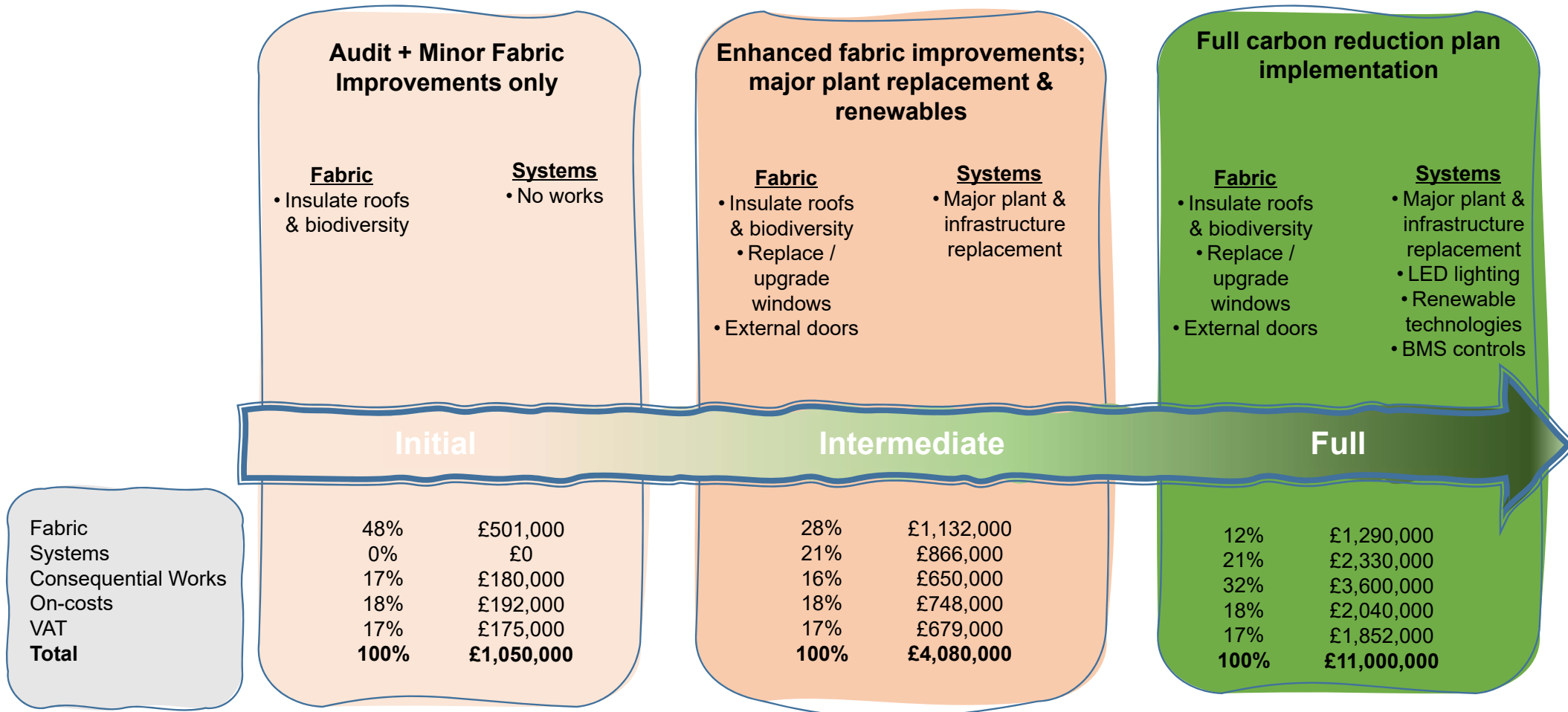
- Building Fabric
- Building Services
- Renewables



Audience Engagement

- Accessibility
- Entrance & Welcome
- Foyer Renewal
- Community Engagement





Fabric
Systems
Consequential Works
On-costs
VAT
Total

48% £501,000
0% £0
17% £180,000
18% £192,000
17% £175,000
100% £1,050,000

28% £1,132,000
21% £866,000
16% £650,000
18% £748,000
17% £679,000
100% £4,080,000

12% £1,290,000
21% £2,330,000
32% £3,600,000
18% £2,040,000
17% £1,852,000
100% £11,000,000

Navigating Market Uncertainty



**COVID-19 &
Brexit**



Procurement



Budget



Funding

How close do we get to Net Zero?

Mike Cook, Avison Young

AECOM

**AVISON
YOUNG**

Bristow

BURO HAPPOLD

Paddy Dillon
Architect

Theatres Trust
Conference 21:
Making Theatre
Sustainable



#MakingTheatreSustainable



How close to net zero?

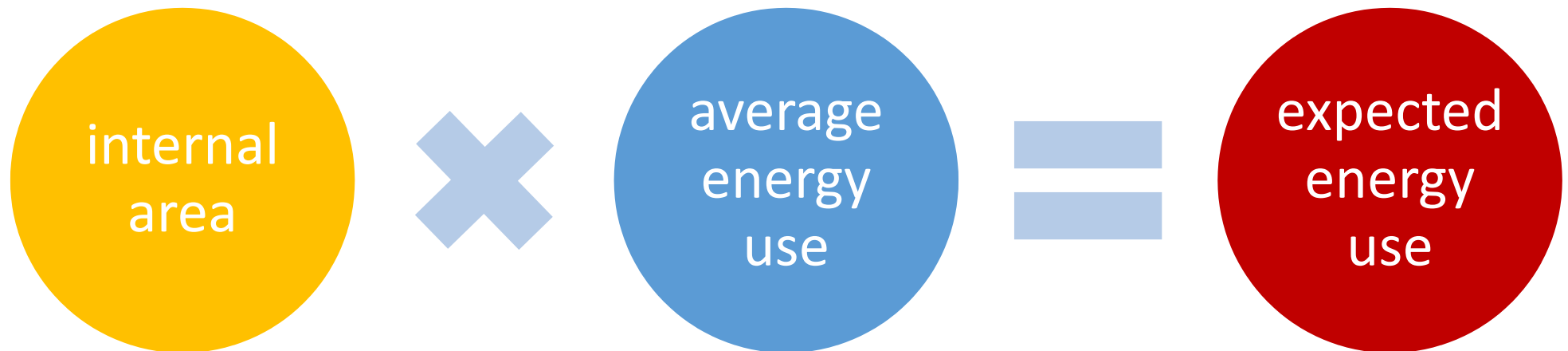
AVISON
YOUNG

Estimating CO₂ emission saving potential across UK theatres

Using notional mid-C20 mid-size theatre
...extrapolating across a % UK theatres

Notional theatre

Energy calculation flow chart



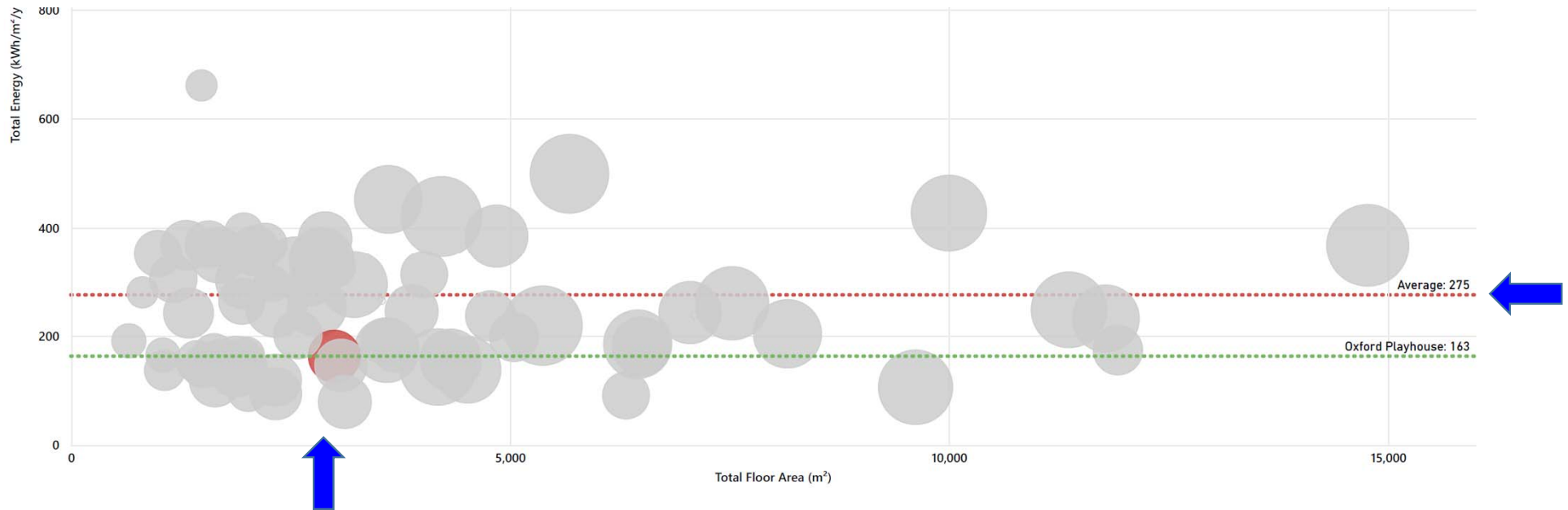
600 seat theatre
say 2,250 m² internal area



What is the expected energy use before
refurbishment works?

100 publicly available DECAs show

- range of energy use (100-500 kWh/m²/yr)
- no significant shift with smaller or larger
- an average value of 275 kWh/m²/yr



for our notional 600 seat theatre,
say 2,250 m² internal area,
and apply 275 kWh/m²/yr.
annual energy consumption **618,000 kWh**



Notional theatre

Energy saving calculation flow chart



consider separately Electric and Gas
using cost and CO₂ emission factors.



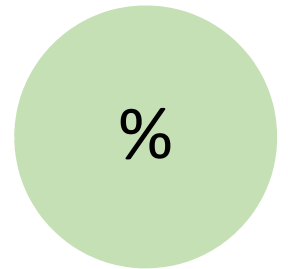
%

Assumed proportions

35% Electric

65% Gas

Estimating annual energy cost using 35% Electric and 65% Gas.



| | | kWh | £/kWh | £ / yr | T CO ₂ |
|---|-----|----------------|--------|-----------------|-----------------------------|
| E | 35% | 216,000 | £ 0.14 | £ 30,000 | 39 T CO ₂ |
| G | 65% | 402,000 | £ 0.04 | £ 16,000 | 93 T CO ₂ |
| | | 618,000 | | £ 46,000 | 132 T CO₂ |

| Intermediate save | k kWhr | £ k | T CO ₂ |
|---------------------------------|--------------|---------------|-------------------|
| Air source heat pump | 240 | -3 | 30 |
| Control vent fan speed | 60 | 8.5 | 10 |
| Heat recovery, auditorium | 30 | 1.3 | 6 |
| Heat recovery, ancillary | 54 | 3.5 | 4 |
| Refinement of control | 30 | 2.2 | 6 |
| Total with all measures | 415 k | £ 12 k | 56T |
| Allowing that not all possible, | | | say 35T |

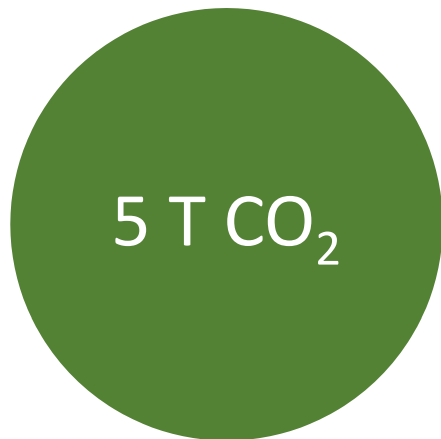
full works annual save

| | k kWhr | £k | T CO ₂ |
|-----------------------------|--------------|-------------|-------------------|
| from intermediate | 415 | £ 12 | 50 |
| LED Lighting | 100 | £ 15 | 23 |
| Renewable technologies (PV) | 96 | £ 13 | 22 |
| controls (further 5%) | 30 | £ 2.5 | 5 |
| | total | £ 43 | 100 |
| make 30% reduction | | | |
| crude conservative estimate | 500 | £33k | 65T |

Annual CO₂ emission save on average

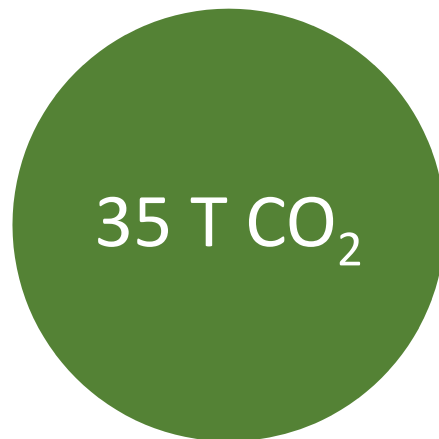
Initial

£1m



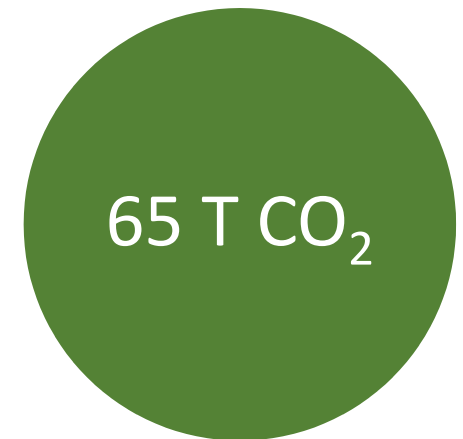
Intermediate

£4m

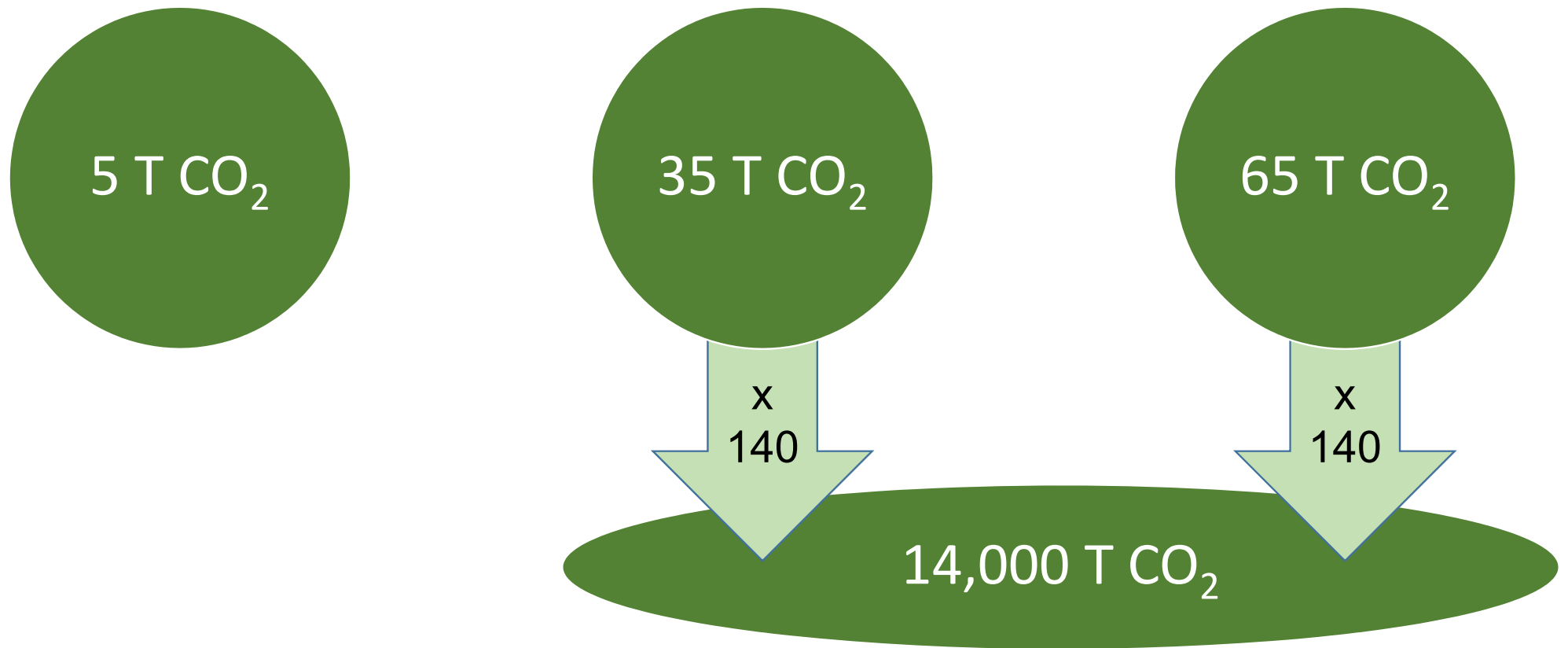


Full

£11m



Annual CO₂ emission across 280 buildings





AVISON
YOUNG

How can we make this happen?

Paddy Dillon

AECOM

**AVISON
YOUNG**

Bristow

BURO HAPPOLD

Paddy Dillon
Architect

Theatres Trust
Conference 21:
Making Theatre
Sustainable



#MakingTheatreSustainable

How do we deliver this?

Public funding

ACE annual grants 2012-2018 £57.3m

ACE annual grants 2018-2022 £18.5m

ACE annual grants 2022- £?m

Covid

Reduced theatre reserves

Increased debts

Uncertain revenue

Trusts and Philanthropy

Have not increased to US levels

Have diverted to rescue funding in Covid

Cannot fill the gap

We need to make regeneration cheaper

Challenge 1

A large number of small, inefficient projects

Challenge 2

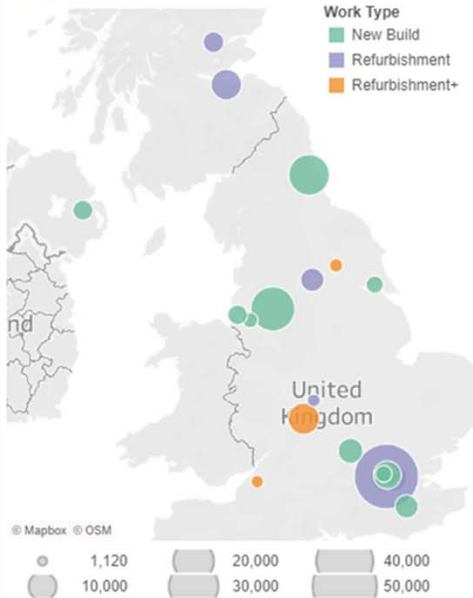
Theatres have no R&D fund to invest in capital projects which might not happen

Looking for solutions : 1

We use data to understand the challenge
and streamline our response

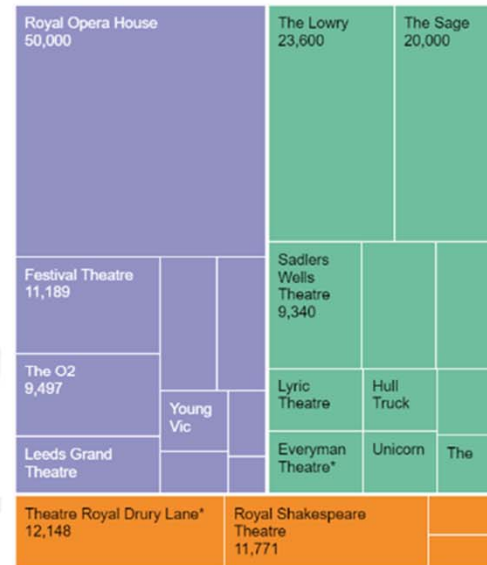
| # of Theatres | Avg. 2020 New Build/m ² | Avg. 2020 Refurb/m ² | Avg. 2020 Refurb +Cost/m ² | Avg. Prelim Cost /m ² | Avg. Area (m ²) | Avg. # of Seats | Avg. Area (m ²)/Seats | Avg. Cost Per Seat |
|---------------|------------------------------------|---------------------------------|---------------------------------------|----------------------------------|-----------------------------|-----------------|-----------------------------------|--------------------|
| 25 | £5,160 | £4,496 | £4,321 | £665 | 8,598 | 1,033 | 7.3 | £26,816 |

THEATRE MAP

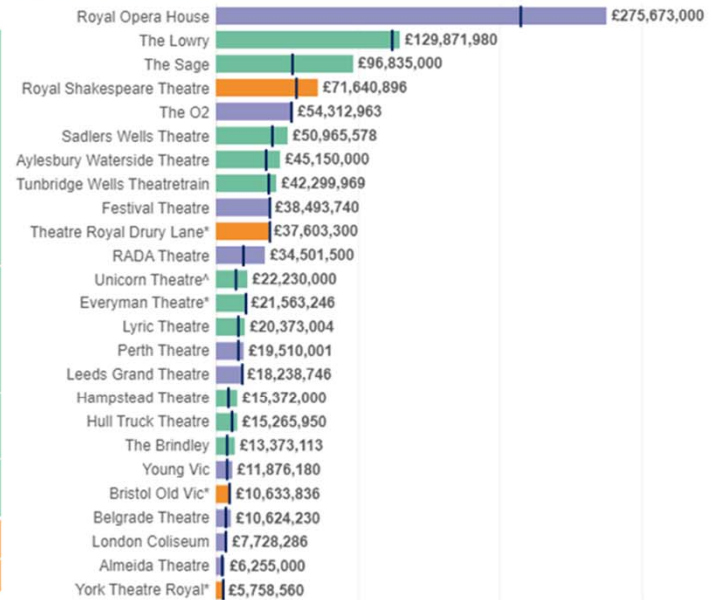


PROJECT METRICS

Cost if built in 2021



BASE VS CURRENT COST

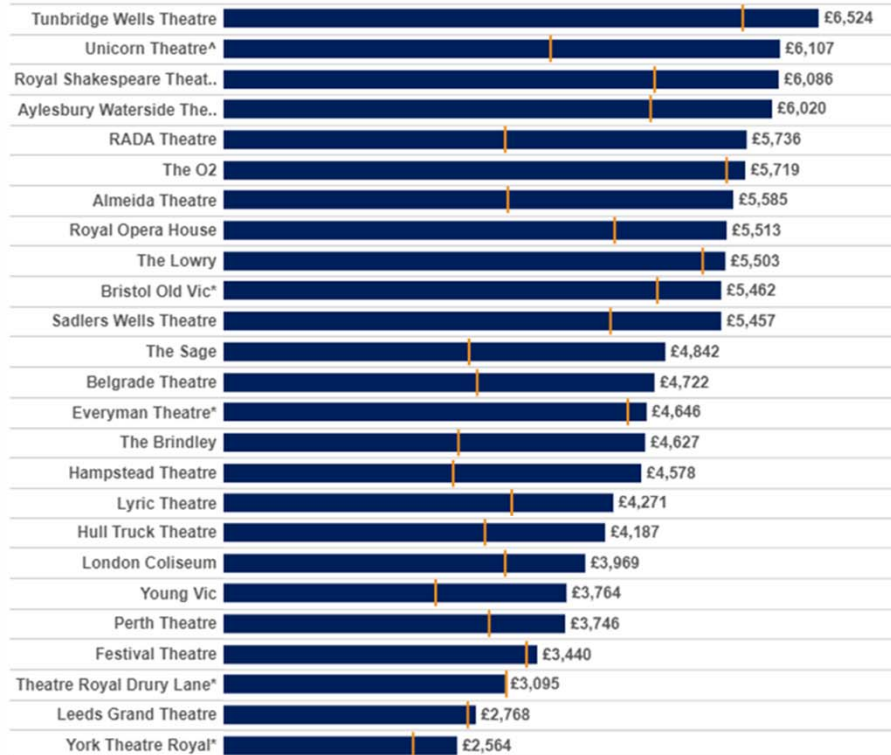


All costs are net, construction-related and therefore exclude fees that may be associated with the project.

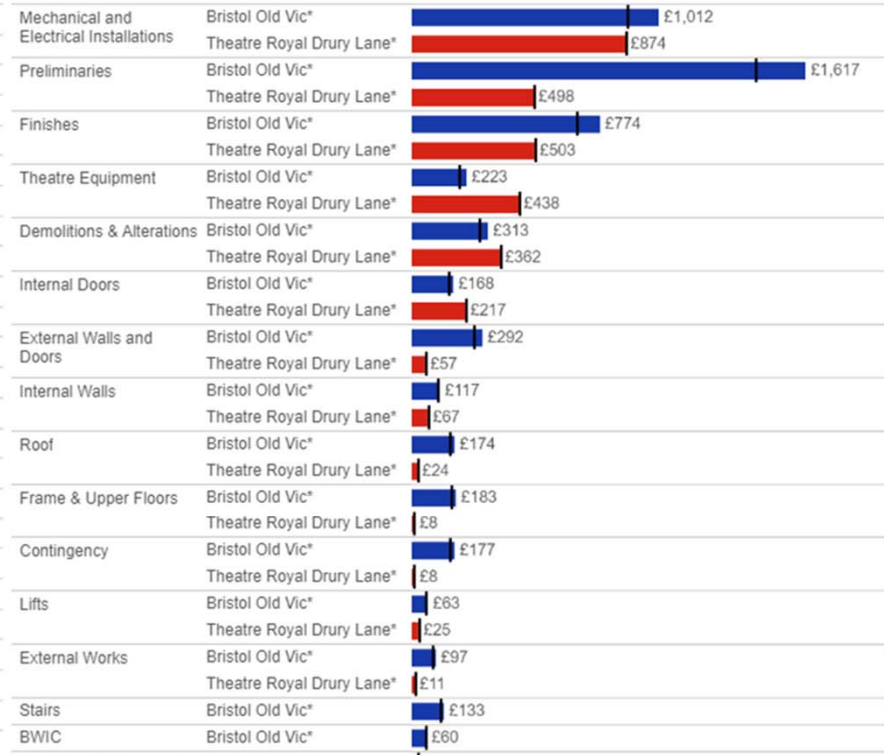
* Denotes projects in which Avison Young were involved with

[^] Denotes projects with incomplete data

THEATRES



COMPARISON



■ Estimate Toggle
 ■ Received Toggle
 ▶ Select a theatre to see a cost breakdown for each element. Select a cost element to see theatres with that element available. Ctrl + click two or more theatres/elements to see a cost comparison for the theatres/elements.

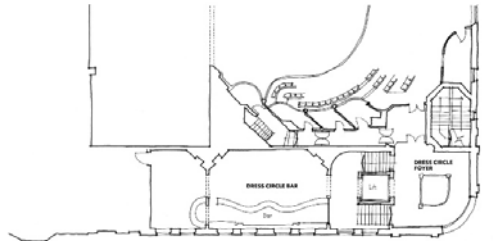
Looking for solutions : 2

The Theatre Green Book : Sustainable Buildings is an example

Looking for solutions : 3

Light touch feasibility

- Reduces costs
- Focuses on client need
- Avoids red herrings



BLACKPOOL GRAND THEATRE
RIBA 65-66-67-68-69-70-71-72-73
Rev. From plan above 1:125 @ A3



Hull Truck Theatre Focus Group Discussions 29th Oct 2019



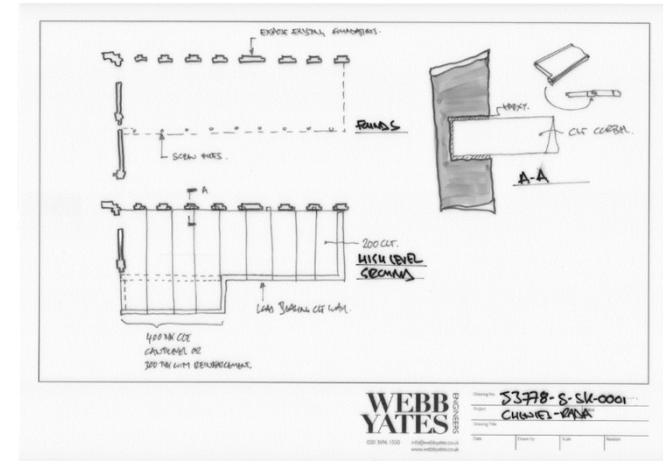
Focus Group No 1 - 3pm to 4.30pm

- Attendees:
- Devide Gallegos (DC) Director of Development, HIT
 - Rachel Hogg (RH) Theatre Administrator, HIT
 - Adam Pownall (AP) Theatre Programmer & Producer, HIT
 - Karl Linley (KL) Manager, Shoot the Bull
 - Rachael Clark (RC) H&M Community Ambassador
 - Kate Plumb (KP) Drama Desk Booker
 - Annex Todd (AT) H&M Ambassador & MS Society
 - Chris Todd (CT) H&M Ambassador & MS Society
 - Oliver Brown (OB) Head of Technical & Production, HIT
 - Ruth Cooke (RC) Director of Communications, HIT
 - Tom Sanders (TS) Associate Director, Creative Learning
- Avison Young Team
- Peddy Dillon Architect
 - Chris Dumas Project Manager

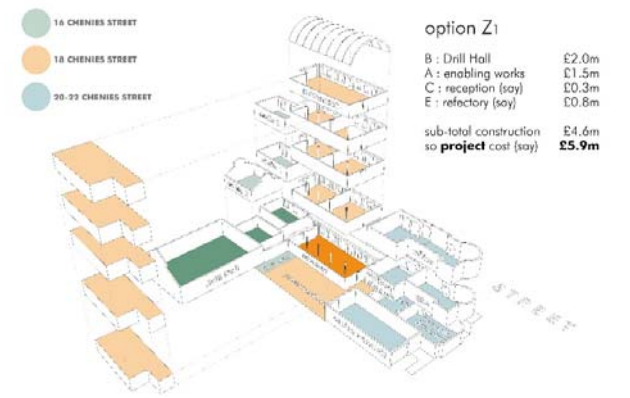
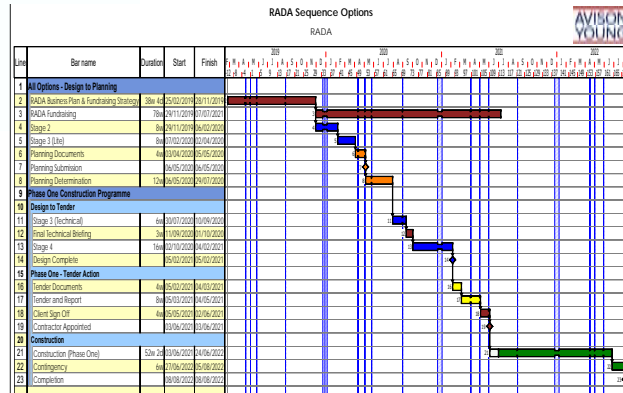
Part 1

- What was your first experience of this venue?
- How does this place make you feel?

- Accessibility**
Front of House Accessibility praised by many.
RH: Good accessibility front of house, but back of House, less so.
CT: "A very friendly building - one of the best accessible buildings I've ever been in."
RC: "Really positive feedback from the MS Society. They came and everyone really enjoyed it."
- Auditorium Comfort**
KP: noted seats not comfortable, though this was not widely shared.
- Invitation & Welcome**
Physically, this building was seen as erecting barriers to the street, "a space for some people and not for others".
At a human level, staff highly praised for their welcome and helpfulness.
- Foyers**
Generally considered dispiriting.
AP: "A dark building."
TS: "Appropriately vibrant when it's full and lively, but that isn't always the case... It's troubling when not full." The colour of floor made it "a black hole".



WEBB YATES
012 936 1000
53778-8-516-0001
CUMMERS-2124



Looking for solutions : 4

Reduce costs to planning

Looking for solutions : 5

Collective procurement

Looking for solutions : 6

Buy-in from Funders