

Low Carbon Buildings

Delivering the building, from
idea to operation.

Anna Halcro-Johnston

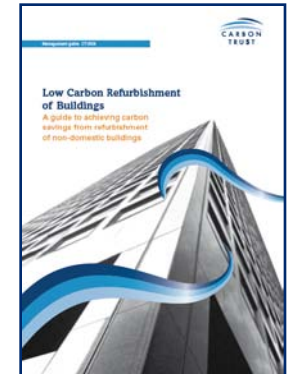
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Building Refurbishments



- The Low Carbon Building Accelerator
- Monitoring 10 low carbon building refurbishments from the design preparation through to operation:
 - *Four retail*
 - *Two restaurants*
 - *Two Government Offices*
 - *One Leisure Centre*
 - *One MOD Site*
- Published the “The Low Carbon Refurbishment Guide” (Ref CTV038)



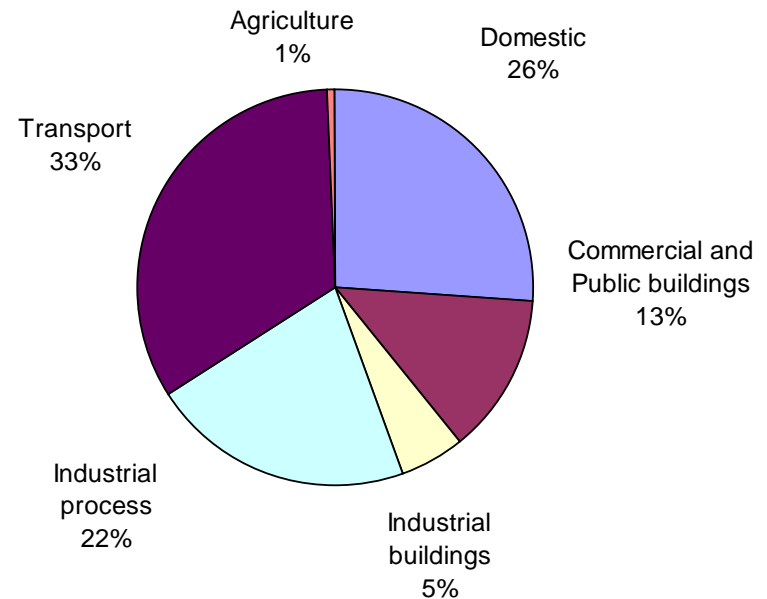
Decarbonising our existing buildings – Why?



For three key reasons:

1. Nearly **50%** of the UK's **total** carbon emissions come from buildings
2. **60%** of the buildings that we work, live and play in now, **will still be here in 2050**
3. **40%** of the 2050 buildings will have been built **pre-1985**

In 2003, the UK emitted 560M tonnes of CO₂⁽¹⁾



Tackling Refurbishments

Refurbishments can be harder to decarbonise than new build:

1. The driver is rarely to reduce carbon emissions
2. Many refurbishments actually lead to an increase in carbon emissions
3. Existing buildings are rarely as “exciting” as new builds
4. Decisions are constrained by the original building structure



The Low Carbon Buildings Accelerator



- The Carbon Trust is working with 10 typical refurbishment projects across the UK
 - *Four retail*
 - *Two restaurants*
 - *Two Government Offices*
 - *One Leisure Centre*
 - *One MOD Site*
- The aim is to understand how carbon reductions can be reduced through building refurbishment
- Monitoring through the following stages:

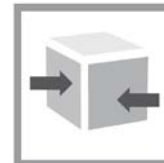
1. Prepare



2. Design



3. Construct

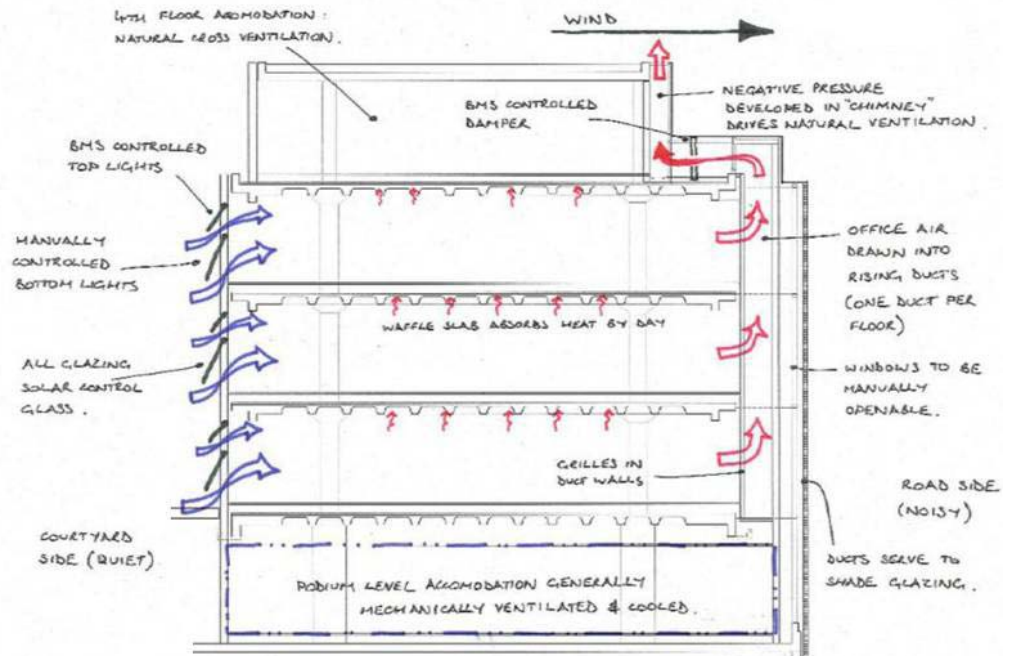


4. Use



Preparation & Design

Get it right from the start



Set Clear Targets

Case Study: North Wales Police

- Agreed to set 20% reduction in carbon emissions
- Design team took up the challenge and modelled a 30% reduction
- The proposals are through improving the building fabric, solar shading and increased zoning and localised control of the BMS



Understand The Starting Point

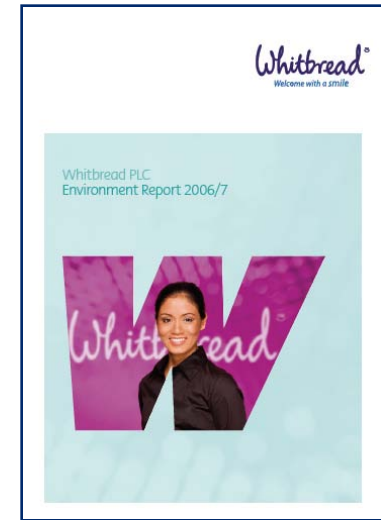


Undertake a pre-refurbishment assessment

Case Study: Hogsmill Pub

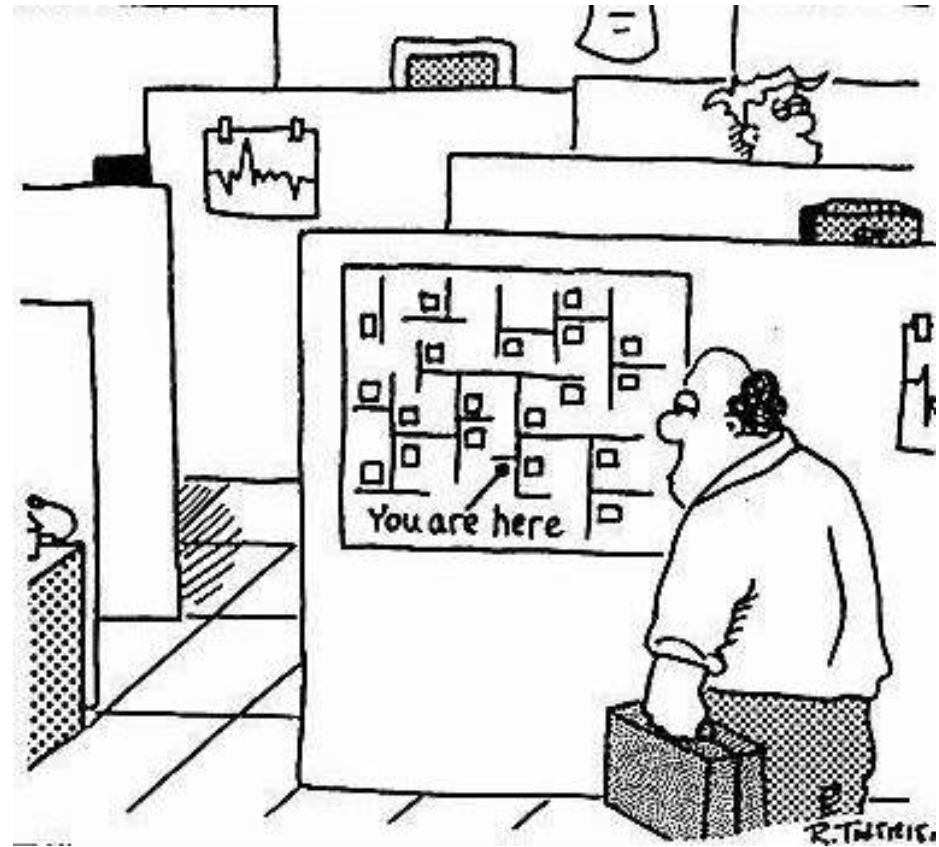
- Older buildings often lack info, drawings etc
- Additional opportunities were identified by an on-site survey
- Increased insulation levels and splitting the cellar in two (stop ice machine and beer coolers venting heat into cooled cellar)

Video case study –
www.carbontrust.co.uk/lcba



Plan for end user

- The building users are often forgotten or incorrect presumptions made.

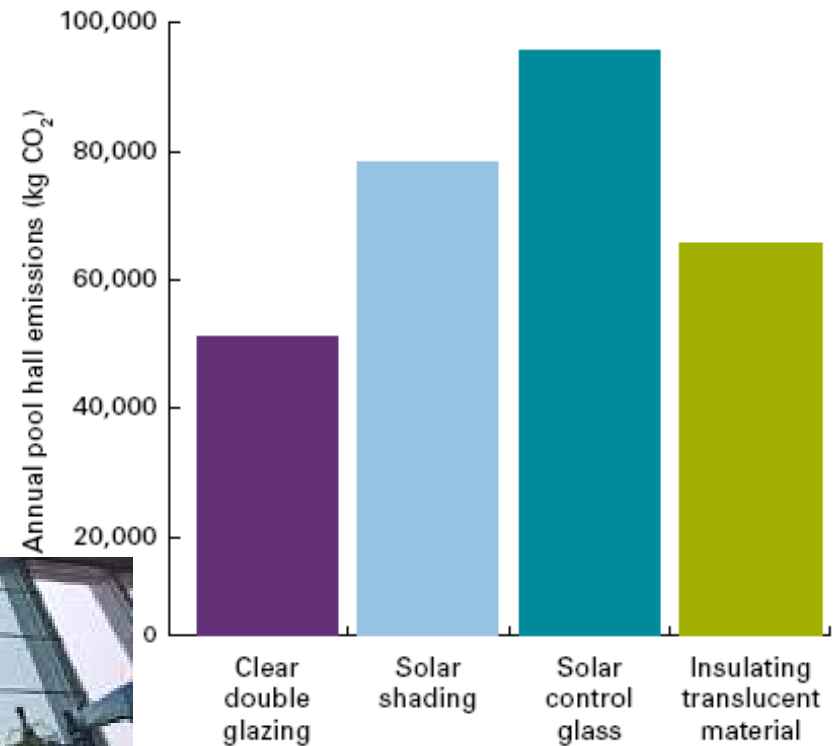


Design for whole building dynamics - modelling



Case Study: Swansea Leisure Centre

- Different options were modelled
- Clear glazing solution was most successful due to solar gain potential



Consider Contractual Innovations – Energy Performance Contracts



- Advantages
 - Reduce technical risk
 - Project Financing
 - Guaranteed Savings
 - Expertise
 - Environment
- Performance contracts – results-driven rather than price
 - EScO
 - Bonus payment on targets met
 - Ongoing percentage share of energy reduction value
- Key requirements for the success of such schemes:
 - the setting-up of an agreed energy baseline against which to measure results
 - human factors such as commitment to the enterprise
 - trust between the co-operating organisations.

Ring-fence budget

- Consider a budget for low carbon elements

Case Study: **Swansea Leisure Centre**

- Additional £500,000 was allocated to carbon emission reduction
- This was 2% of the original budget
- Allowed contribution to technologies such as a biomass boiler, backwash heat recovery, water cooled ammonia chillers and plant room heat recovery



Case Study: **Marks and Spencer**

- Now undertake a pre-refurbishment energy audit during store remodelling programme.
- Major items are funded from the essential works budget.
- Other measures can be funded from a separate energy efficiency budget



Plan commissioning and handover strategies early

- Consider “soft-landing” approach –
www.softlandings.org.uk
- Employ commissioning expertise directly
- Expect, and require, strategies to be developed during design and continually checked / updated as the project progresses



Refurbishment / Construction

Keeping it on track



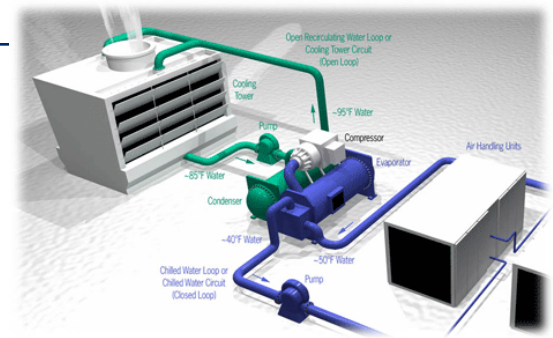
Protect the project spec'

Watch out for...

- Value engineering
- Nervy decisions on innovative approaches and technologies

Case Study: John Lewis Partnership

- Opted for magnetic bearing chillers
- Increased capital cost of 50% against standard chillers
- However payback of 3.7 years
- Saving £54,000 per year



Keep energy performance at forefront of all decisions

Engage The CEO and Empower The Project Manager

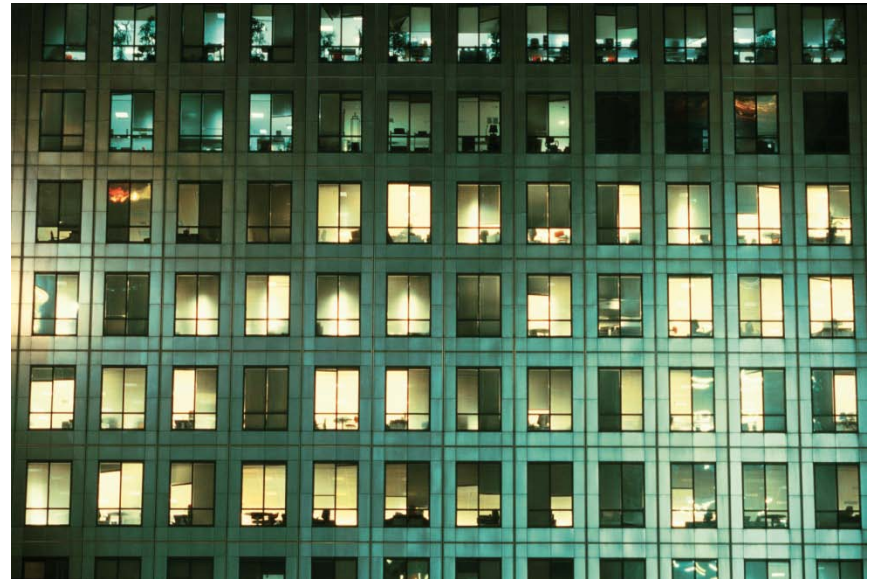


- And, if necessary, use distraction techniques on middle management...



Achieving Performance

The building achieving, or exceeding, the design intent



Place importance on building handover and training



- Get the experts in
- Understand building philosophy and set controls
- Train the users



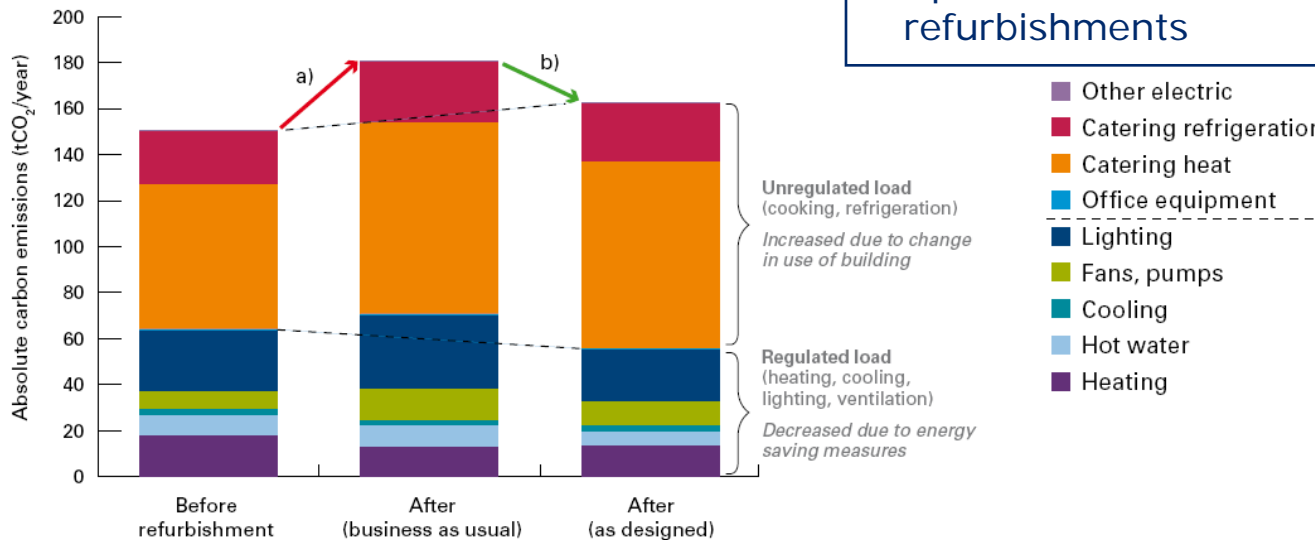
Watch Unregulated Load

Case Study: Hogsmill Pub

- Unregulated loads increased

Case Study: John Lewis Partnership

- Amended restaurant equipment specified to include more low carbon versions
- Updated list will be used for all future refurbishments



Keep Monitoring Performance

- month on month, year on year



Mitigate against:

- Performance drift
- System failures
- User changes

Enable:

- Energy reduction opportunities
- ...and gain recognition for ongoing reductions
 - www.carbontruststandard.com



In Summary

➤ **Starting with a good design**

- Set clear targets
- Consider contractual incentives to encourage best energy performance

➤ **From design to finished build**

- Mitigate against spec' dilution from value engineering and "nervy" decisions
- Give commissioning the time and resource it deserves

➤ **Operating to best performance**

- Prioritise building handover and training
- Watch unregulated load
- Keep monitoring performance, month on month, year on year...

Sheep in wolf's clothing...



Low carbon buildings may not always “look” low carbon

Hampshire County Council - Video Case Study



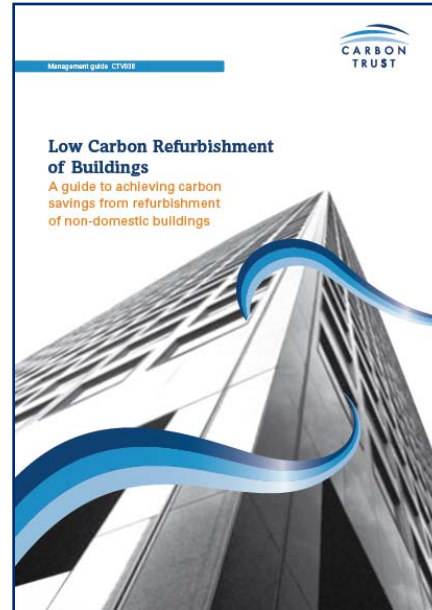
- £40M refurbishment
- Taken over 4 years including design
- Innovative natural ventilation solution
- Refurbishment driven by occupier comfort



Before



After



Code:

CTV038

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