RIBA

CPD Birmingham
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PART 3

UBT
Usable Buildings Trust

CASE STUDY
Feeding forward:
National Trust to Woodland Trust

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the Usable Buildings Trust
www.usablebuildings.co.uk

National Trust Swindon

Woodland Trust Grantham

ARCHITECTS: Feilden Clegg Bradley Studios, ENVIRONMENTAL ENGINEERS: Max Fordham.

2006-07 Mini-Probe at Heelis
National Trust Headquarters, Swindon

Offices, catering facilities for staff & public, central IT server, shop.

Client and design intent for a sustainable building, including:

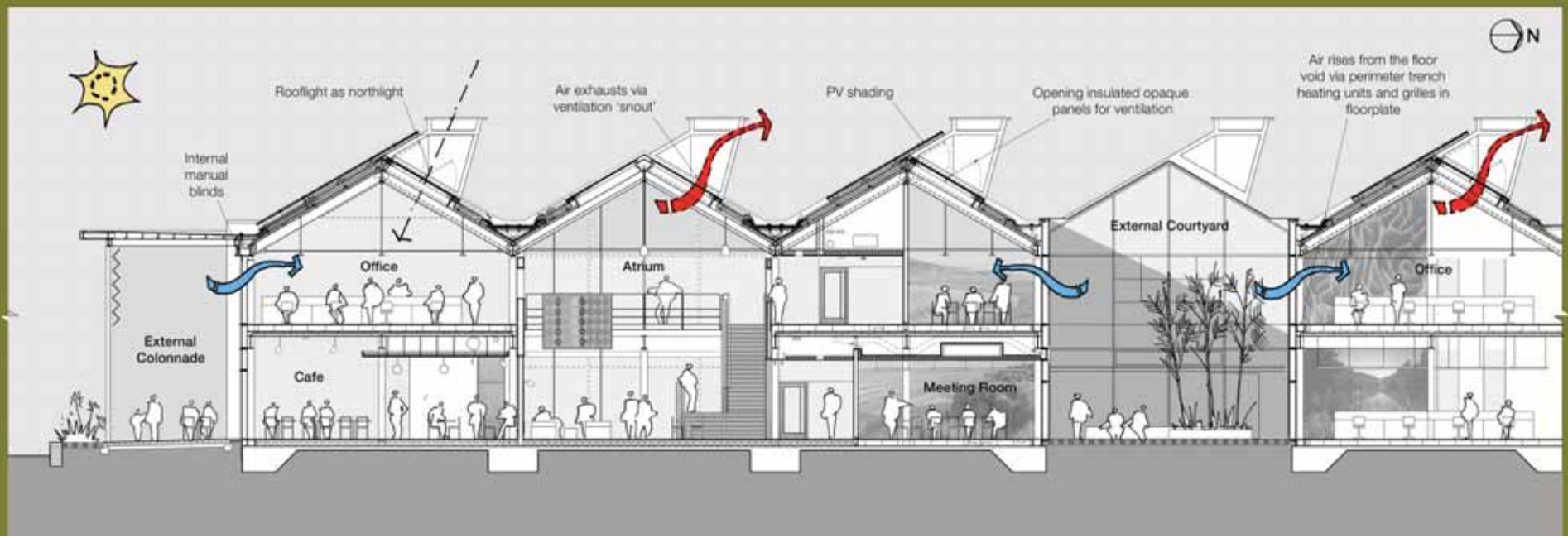
- Deep plan (with courtyards) for good communications.
- Low rise (2 storey) with rooflights for natural light and ventilation.
- Automatic natural ventilation with low energy mechanical backup.
- Large photovoltaic array.
- Expectations managed using a matrix of features vs. aspirations.

Procured as a pre-let:

- Scheme design by Feilden Clegg Bradley (FCBS, architects), Max Fordham (building services), Adams Kara Taylor (structural).
- After RIBA Stage D, design team novated to: Aim Investments (investor), Kier Ventures (developer), Moss (contractor).

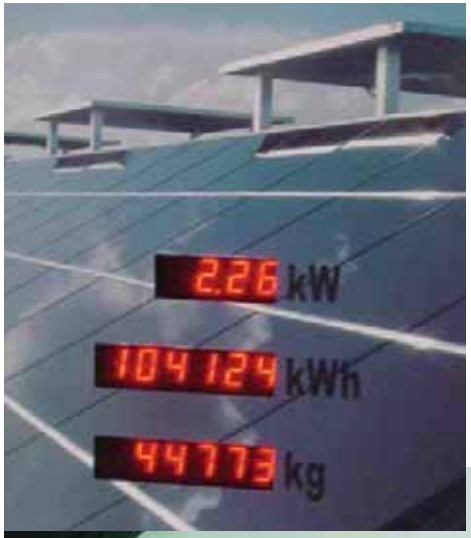
Awards 2006: *BCO Innovation, Civic Trust Sustainability, RIBA Sustainability.*

FCBS spent the RIBA prize money on the POE, plus a bit for a party!


N
Rooflight as northlight
Air exhausts via ventilation 'snout'
PV shading
Opening insulated opaque panels for ventilation
Air rises from the floor void via perimeter trench heating units and grilles in floorplate
Internal manual blinds
Office
Atrium
External Courtyard
Office
External Colonnade
Cafe
Meeting Room

Heelis office interior

Heelis: some environmental systems



Heelis POE 2006-7: some conclusions

- DAYLIGHT: design should take account of indoor appearance, not just desktop illuminance. *Added wall washing would save lighting energy.*
- SPECIAL AREAS: Energy in server room and kitchen accounted for more than half the CO_2 emissions. *Need more design & management attention.*
- METERING & MONITORING: More attention needed. *Automated in 2012.*
- HEATING & HOT WATER: *Performance disappointing.*
- ENERGY MANAGEMENT. Improved in 2007, deteriorated 2008-2012, now improving. *Scope for more savings, including reduced night loads.*
- SUMMER COMFORT. Occupant survey shows satisfaction improved in 2007, owing to cooler weather, better control and management. *Reportedly better still now, after control upgrades in 2012-13*
- WINTER COMFORT. Improved: window controls were fine-tuned in 2007. T*he control system was replaced in 2012, allowing individual adjustment.*
- OCCUPANT SATISFACTION: Heelis (2007) had the best overall score in the BUS database for “green” buildings with deep floorplates *(but simpler, shallower buildings tend to perform better, with better perceived control).*

Technology Strategy Board
(now called Innovate UK)
Building performance evaluation (BPE) programme

Feeding forward from Heelis to the Woodland Trust HQ, Grantham

Followed in the footsteps of Heelis, with FCBS, Max Fordham, *and the CEO of Woodland Trust who joined from the National Trust.*

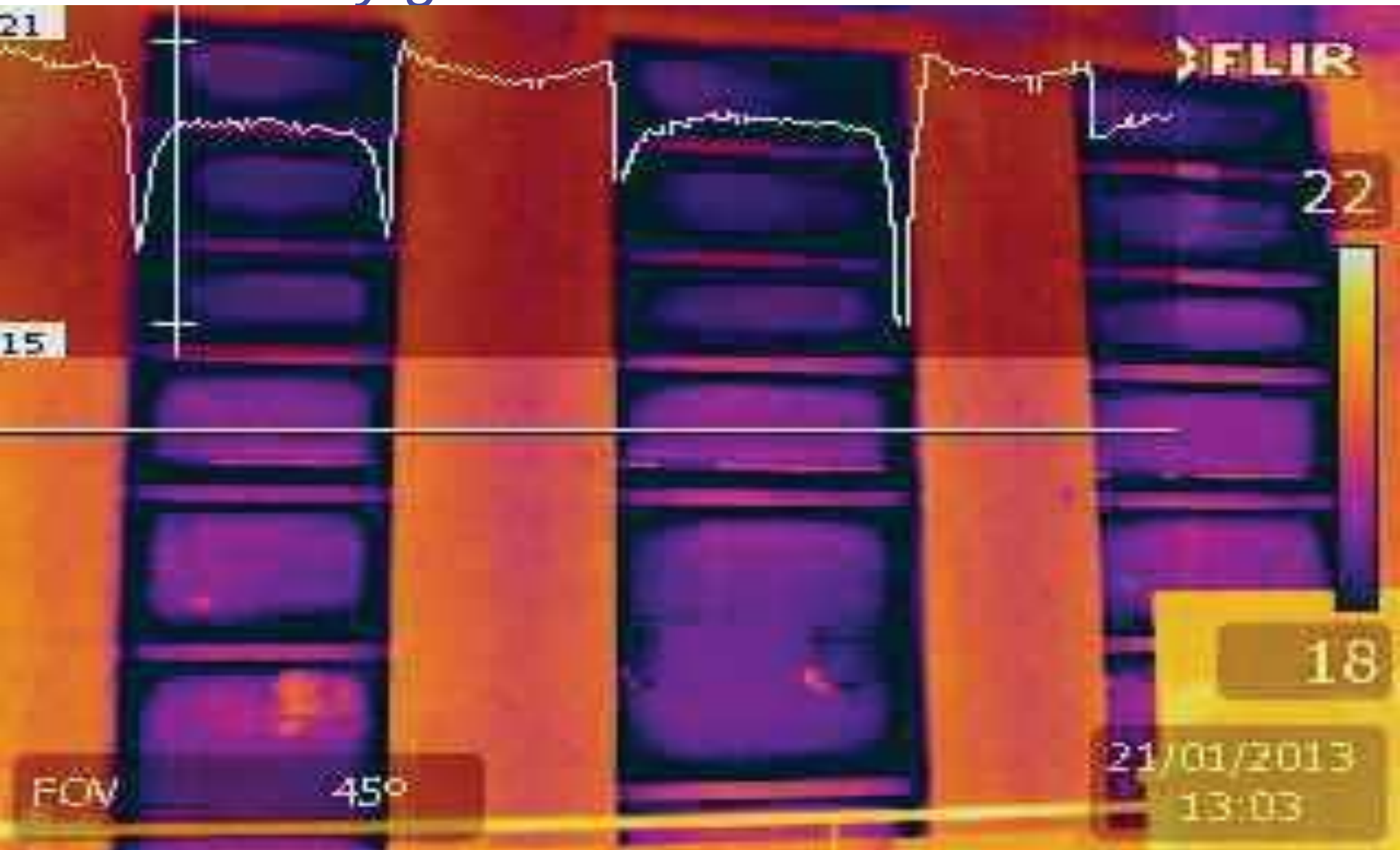
SOME LESSONS INCORPORATED IN THE DESIGN (2008):

- Make it simpler: *controls, shallow plan, naturally ventilated*
- Task-ambient lighting in main offices.
- More energy-efficient ICT, *with thin clients.*
- Rudiments of Soft Landings, *though not rigorously adopted.*
- Early appointment of Facilities Manager.
- Managed move-in process, *with newsletters from the FM.*
- Follow-through, *with successful bid to TSB for evaluation.*

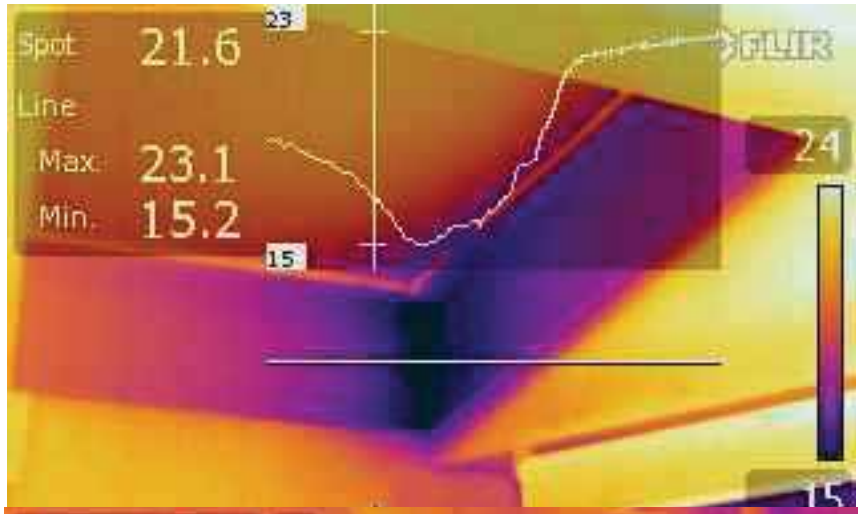
Woodland Trust: *cross-laminated timber construction with added thermal mass*

Woodland Trust Fabric

Generally good. Windows could be better

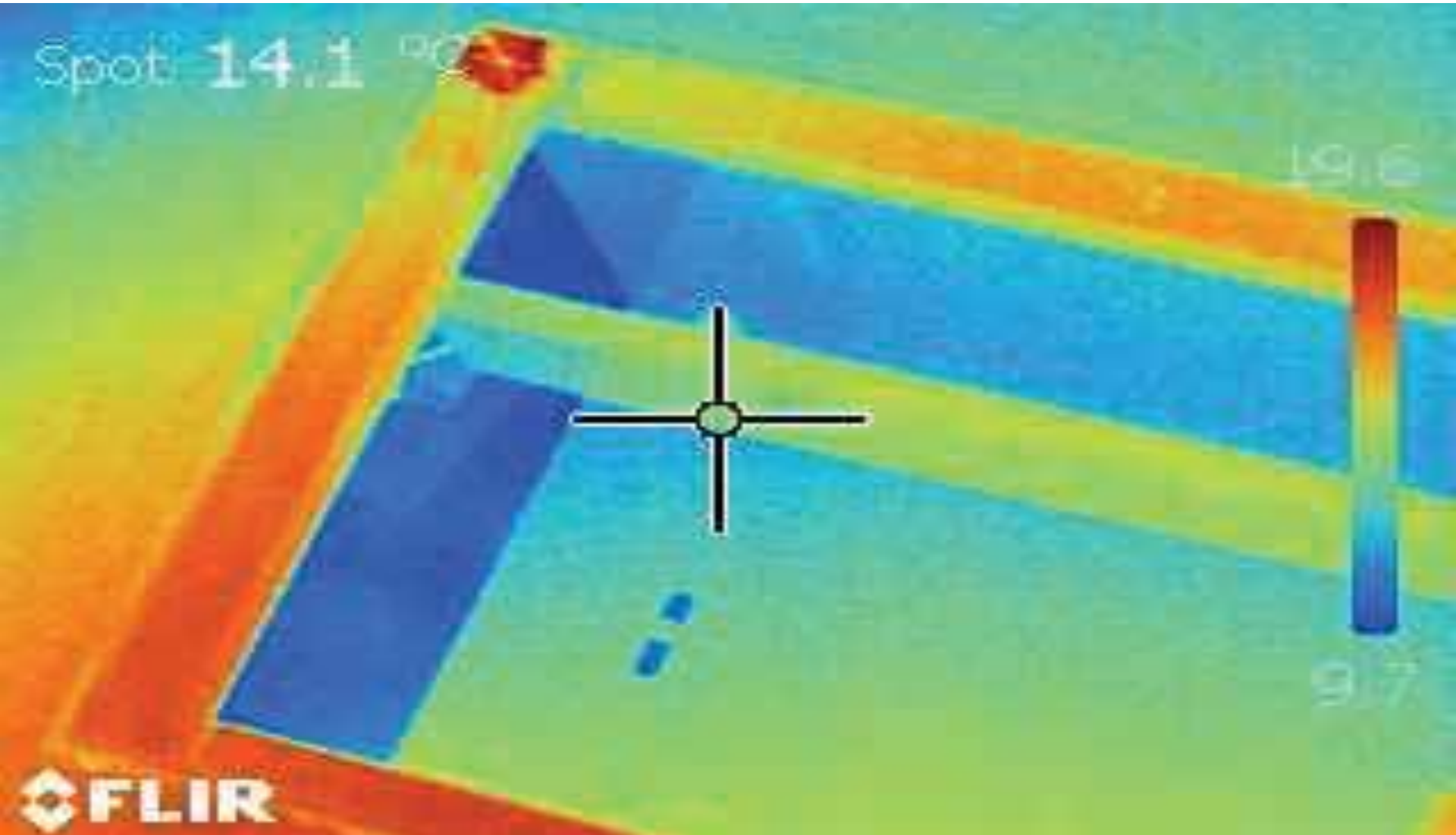


Heelis' steel-framed construction had many thermal bridges



Woodland Trust Fabric

Don’t leave ends of trench heaters open



Woodland Trust
Energy overview

- Low gas consumption
  but hot water still somewhat wasteful.

- Interior lighting much better than benchmark
  but scope remains for better efficiency and control.

- Modest office equipment load due to thin clients
  but they and the phones shouldn't stay on 24/7.

- Large energy use in the server room and its cooling
  in hindsight the equipment may have been over-specified and its cooling system too elaborate.

Lighting worked well. Uniform size workstations had some problems.

Lighting in context *(modest use of task lighting, even on a dark winter evening)*

Glare can come from surprising places

Time control of ambient lights inaccessible

Control ergonomics - an architectural problem: don't leave it all to the engineer, or the contractor!

Key issue: ICT energy use

Higher than Heelis, in spite of all the effort

55% of the building's CO_2 emissions were from server room and its cooling.

Thin clients accentuate this

Future cloud computing will push this load upstream.

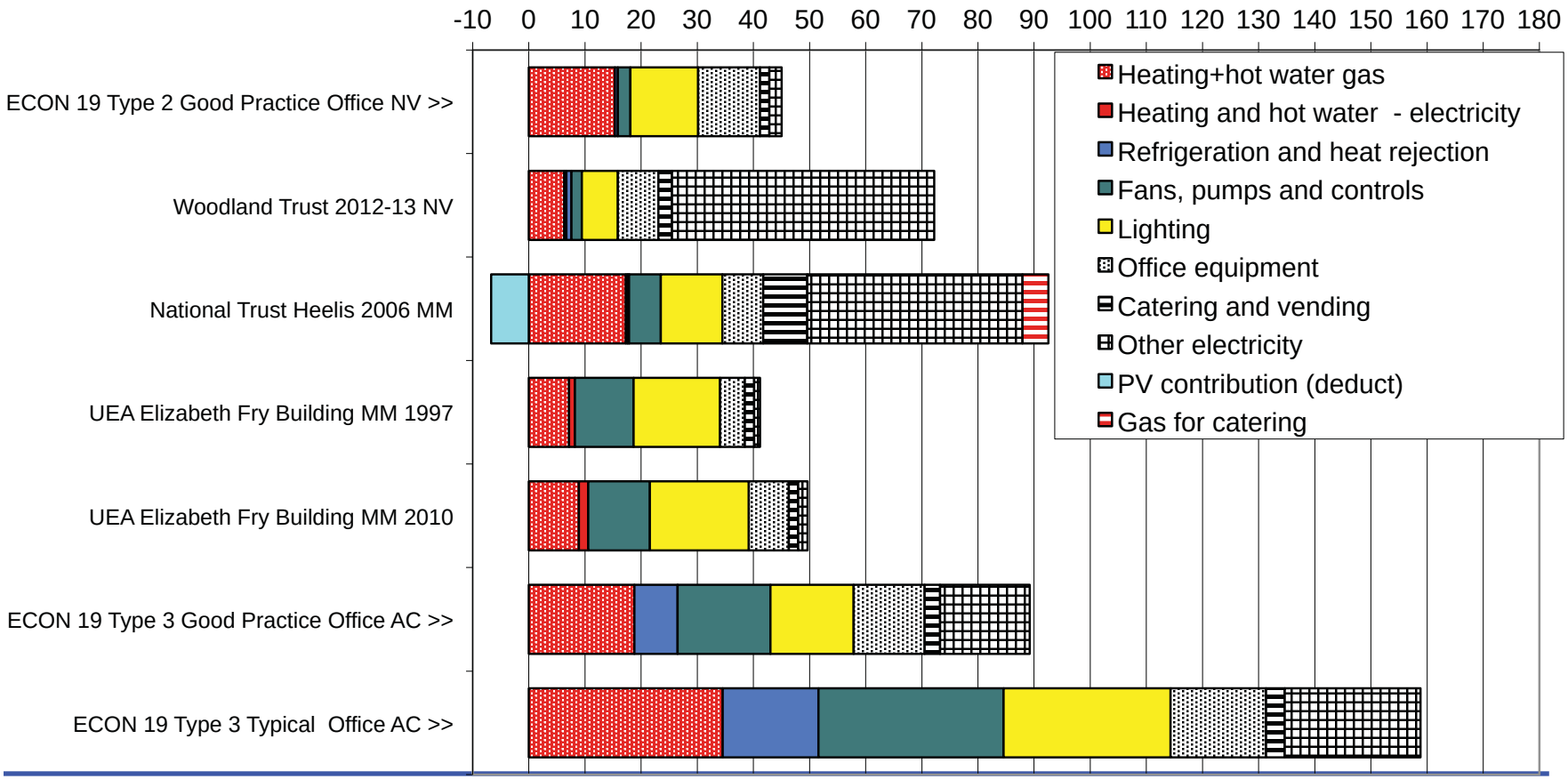
Contrast this with the push for energy supply to move downstream having headed upstream during its rise.

ICT energy efficiency consultant recommended for future projects.

Woodland Trust energy performance
expressed as annual CO_2 emissions

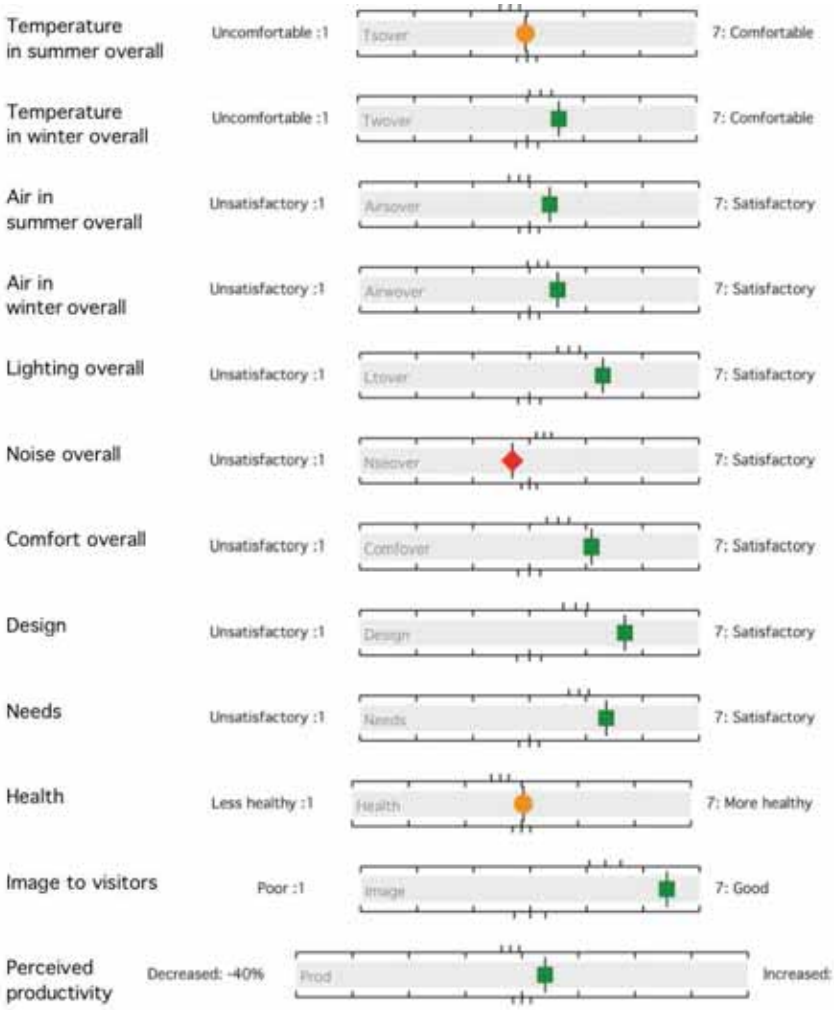
Annual CO_2 emissions comparison

kg/m² Treated Floor Area at UK CO_2 factors of 0.194 for gas and 0.55 for electricity

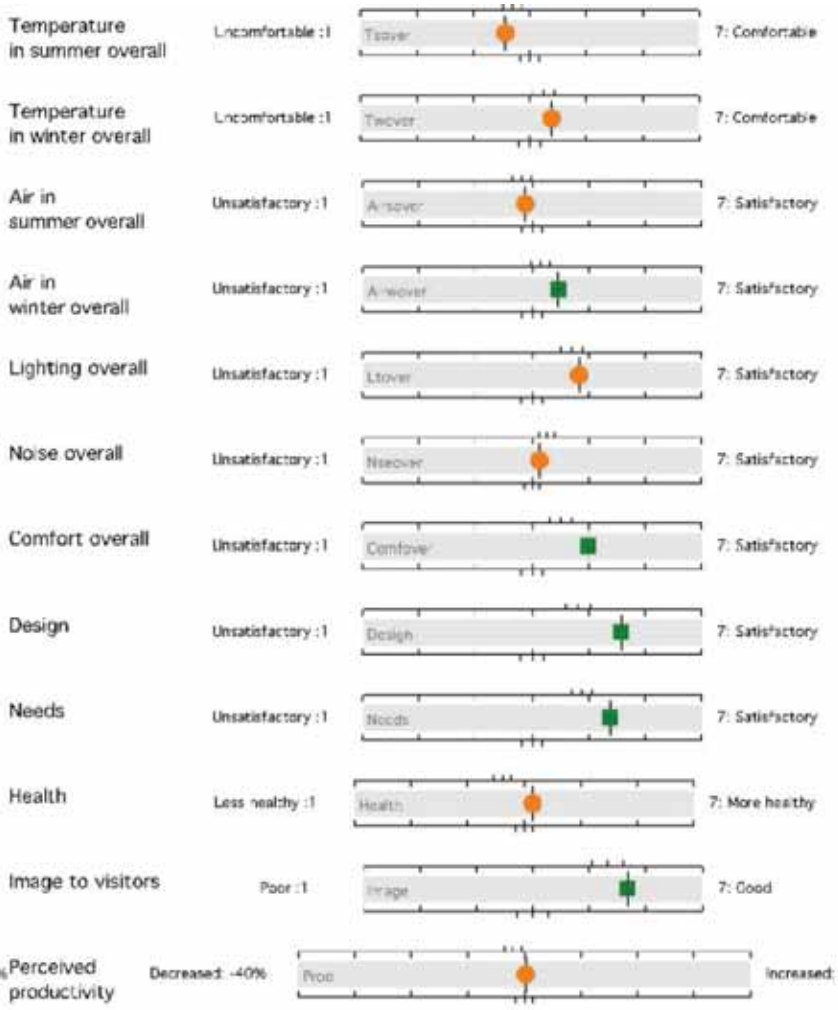


BUS Occupant survey results

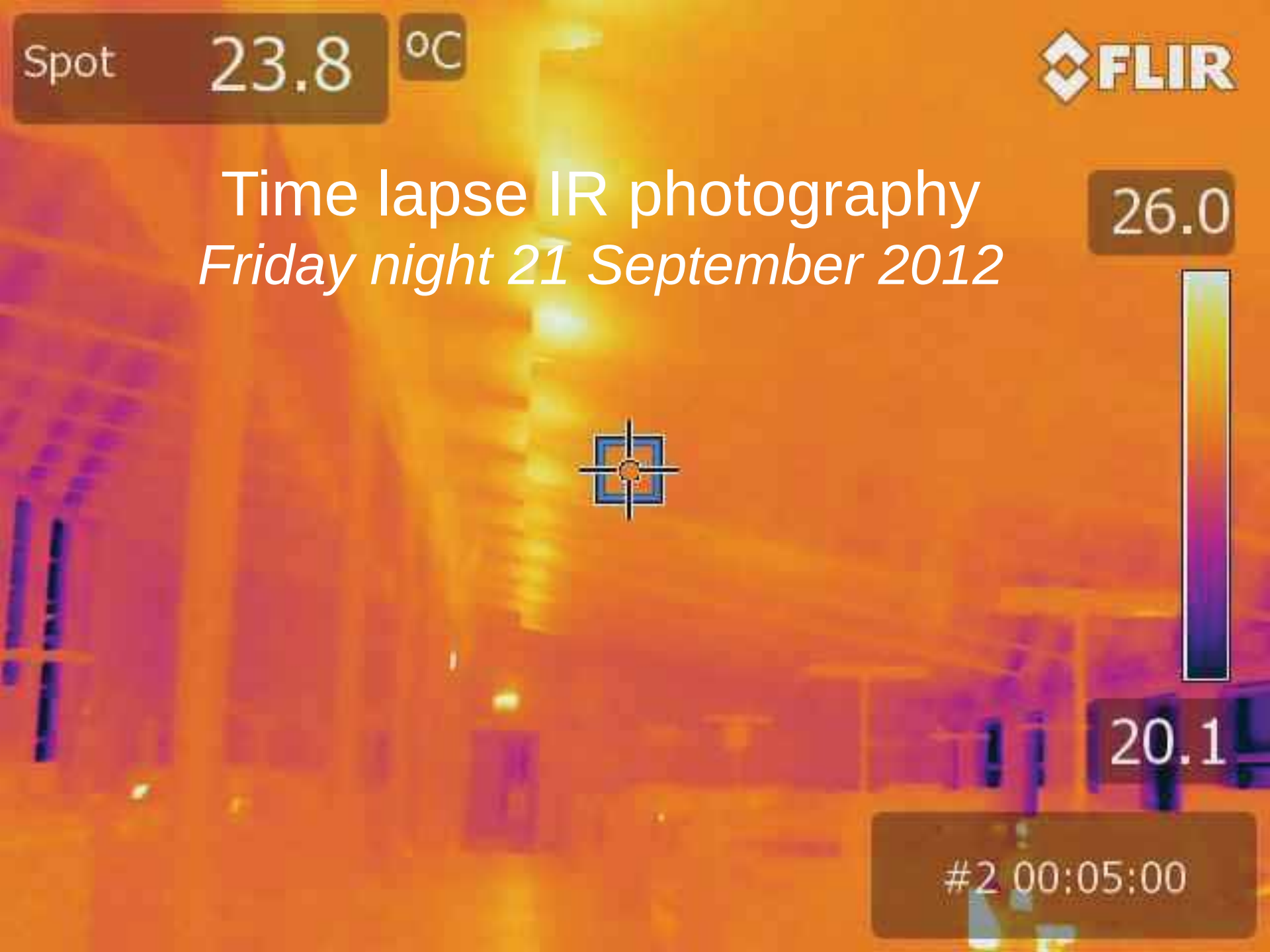
Woodland Trust 2012



Heelis 2006



Natural ventilation control initially too coarse to avoid draughts. Night cooling needed fine tuning.
Needed considerable work in 2012-3


Spot 23.8 °C
FLIR
Time lapse IR photography
Friday night 21 September 2012
26.0
20.1
#2 00:05:00


Spot 19.7 °C
FLIR
Time lapse IR photography
Saturday Morning 22 September 2012
21.3
13.5
#115 09:30:00

Some things that have been learnt
from Heelis and the Woodland Trust

- SIMPLER BUILDINGS and KIT: Considerable potential, but still needs care.
- FINE TUNING IN THE FIRST YEAR OF OCCUPATION. Needs very different priorities from normal practices during the defects liability period.
- NATURAL LIGHTING: Good, but glare can come from unexpected places.
- ELECTRIC LIGHTING: Task-ambient strategy successful. Would benefit from more finesse in control, together with more efficient lighting generally.
- HEATING: Woodland Trust uses much less gas. Further improvements planned. Hot water generation probably best separated from heating.
- CONTROLS AND BMS: Still in need of much more attention to detail.
- WINTER VENTILATION: Tricky to introduce controlled quantities in winter at the Woodland Trust. Mixed mode at Heelis may be more robust.
- SUMMER VENTILATION AND COOLING. Optimisation required at the Woodland Trust, owing to control issues and security concerns.
- WORKSTATION PLANNING: Needs flexibility. One size doesn't fit all.
- ICT SYSTEMS: In spite of major efforts, ICT and the associated HVAC still dominates electricity use. Some tuning now happening, with specialist advice.

“The Woodland Trust are lucky to have got less complication than most.

It is difficult enough to cope with the complication we have got.”

MANDY LOOSE
Facilities Manager

www.usablebuildings.co.uk