Edge - CIBSE President’s Debate
Arup, Bristol, 8 September 2011

Cutting carbon at any cost?

Saving money, saving energy, saving carbon

Using the evidence under our noses.
Changing the way we do things.

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Most designers and builders know little about performance in use - they’re not paid to!

“in theory, theory and practice are the same, in practice they aren’t”
SANTA FE INSTITUTE

“designers seldom get feedback, and only notice problems when asked to investigate a failure”
ALASTAIR BLYTH
CRISP Commission 00/02

“I’ve seen many low-carbon designs, but hardly any low-carbon buildings”
ANDY SHEPPARD  Arup, 2009

“unlike medicine, professions in construction have not developed a tradition of practice-based user research … data about design performance are out there, in the field … Our shame is that we don’t make anything like enough use of it”
FRANK DUFFY, Past President RIBA  Building Research & Information, 2008

New non-domestic buildings:
What do we tend to find … for many years now?

• They often perform much worse than anticipated, especially for energy and carbon, often for occupants, and with high running costs, and sometimes technical risks.

• Design intent is seldom communicated well to users. Designers and builders go away at handover.

• Unmanageable complication is the enemy of good performance. So why are we making buildings technically and bureaucratically complicated in the name of sustainability, when we can’t get the simple things right.

• Buildings are seldom tuned-up properly. Controls are a mess. If we have more to do, what chance do we have?

• Modern procurement systems make it difficult to pay attention to critical detail. A bad idea when promoting innovation.

• “The British spare no expense to get something on the cheap”. …NIKOLAUS PEVSNER

KEEP IT SIMPLE, DO IT WELL, FOLLOW IT THROUGH, TUNE IT UP, CAPTURE THE FEEDBACK

SOURCE: For more information, go the Probe section of www.usablebuildings.co.uk
Why are these lights on in a new university building?
Controls, usability and manageability need to receive much more attention

“An intelligent building is one that doesn’t make its occupants feel stupid”… ADRIAN LEAMAN

“We sell dreams and install nightmares”… BMS SUPPLIER
Don’t procure what the occupier can’t afford to manage.
In 1994, two of these boilers heated a 3000 m² university building – E Fry (@ 15 W/m²).

So why does a recently-completed “zero-carbon” school have 60 W/m² of biomass boiler power with gas backup?
Why are we spending money on green bling when we aren’t getting the fundamentals right?
We must trap unintended consequences
Take account of everything, in design and in use.

In 2008-09, this frost thermostat (improperly set at 17°C on installation) energised the wall heater in a plant room of a new low-energy school, and wasted more electricity than the wind generator (intended to offset the entire building’s annual heating energy use) created.
Dwellings are now catching the nondomestic disease of unmanageable complication

SIGMA HOUSE, BRE *(illustrated)*
- Extensive feedback from occupants, including comfort, ergonomics, space.
- Complicated, confusing and unreliable technologies and renewables.
- Energy use much more than anticipated.

ELMSWELL, ORWELL
- Two-thirds of residents could not programme their thermostats.
- MVHR was present, but 95% of people opened windows in winter.
- Design air change was 0.5 to 1 ac/h. One open window could provide 17 ac/h!

SORCE: Sigma monitoring by Oxford Brookes University, Elmswell by Buro Happold in KTP with Bristol University.
Getting the leverage on emissions: *First people, then energy, then carbon*

- Engage people - *if not, there may well be unintended consequences.*
- Reduce demand - *prevention is better than cure!*
- Increase efficiency - *of the services that meet the demand.*
- Avoid waste << *where to start in existing buildings.*
- Decarbonise supplies - *but low-carbon energy is a scarce resource not to be squandered: get the demand down first.*
- Get results by doing things simply, cheaply ... and well!
- Make use of Opportunity Points.

**BIG SAVINGS ARE POSSIBLE USING THE MULTIPLIER EFFECT, e.g.**

- Halve the demand  \( \times \)
- Double the efficiency  \( \times \)
- Halve the carbon in the supplies ... AND

*You are down to one-eighth of the carbon.*

*Much energy use comes from the compounding of unnecessary loads ... A LOVINS*  

**PREVENTION IS BETTER THAN CURE!**
Getting more sense into procurement
*Soft Landings can help*

It can run alongside any procurement system, and helps to:
- Improve briefing.
- Manage expectations and improve quality during design and construction.
- Link building performance and FM to design.
- Ease transition to occupation.
- Reduce post-handover problems.
- Facilitate monitoring, POE and feedback.
- Capture learning.

It can help design and building teams to:
- Relate design targets to achieved outcomes.
- Manage expectations and review performance at intervals throughout a project, and on into use.
- Allocate responsibilities, *including client responsibilities, ICT, catering etc.*
- Improve relationships with clients and users.

SOURCE: downloadable from www.usablebuildings.co.uk and www.softlandings.org.uk
Follow-through can pay for itself

Intervention in a recently-completed school

Saving £50,000 p.a. in electricity bills: avoid default to ON

Getting it right: Robust buildings, refurbishments and improvements

- Get the brief right, based on practical insight.
- Get the standards right: avoid mission creep.
- Get the fabric right: passive measures.
- Get the services right: gentle engineering.
- Get the other things right: ICT, catering etc..
- Get the controls right; and their user interfaces.
- Get it built right; with a suitable procurement path.
- Get it finished right: commissioning, operator and user engagement, handover, aftercare.
- Get it operated and used right, information, training, monitoring and review, troubleshooting and fine tuning.
- Keep it up to the mark, monitoring, feedback and continuous improvement. Purchasing and contracts for outsourced services.
- Don’t make it too difficult and expensive to look after.
Take one zero off your budget and creativity begins.
Take two zeros off and you have sustainability …

JAIME LERNER, former Mayor of Curitiba, Brazil