Tuning Intuition

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An Engineer is a professional, applying science, maths and ingenuity to develop solutions for technical and practical problems.

Engineers design materials, structures, machines and systems.

Engineers make ideas real

BUT what happens when the changes required are more than technical?
‘Enabling cities where human beings live comfortable and fulfilling lives with the minimum adverse impact on our environment’
Objective

Subjective
De-Carbonising UK building stock

Chart Title

Built environment contribution to UK greenhouse gas emissions

HOUSING
Left Brain
A Systems Approach
Sustainability

‘Starting downstream multiplies savings by about tenfold upstream—yet this design principle is almost never taught’

Amery Lovins - Rocky Mountain Institute
If we halve the demand by building a better building
This is what happens
How to achieve an 80% cut in the carbon impact of the built environment

The multiplier effect

“Halve the demand, double the efficiency, and halve the carbon in the supplies, and you are down to one-eighth of the emissions”
Task Force Member Bill Bordass
Now we double the efficiency of the systems in this low energy building.

This is what happens:
How to achieve an 80% cut in the carbon impact of the built environment

The multiplier effect

“Halve the demand, double the efficiency, and halve the carbon in the supplies, and you are down to one-eighth of the emissions”
Task Force Member Bill Bordass
How to achieve an 80% cut in the carbon impact of the built environment

Finally we decarbonise the fuel supply by 50%

This is what happens
How to achieve an 80% cut in the carbon impact of the built environment

The multiplier effect

“Halve the demand, double the efficiency, and halve the carbon in the supplies, and you are down to one-eighth of the emissions”
Task Force Member Bill Bordass
• Drawing an analogy with the ‘nuclear swerve’ of the 1980’s when there was a growing public feeling that it was ‘deeply wrong, perhaps evil, to engage in nuclear war’ it is suggested that a similar ‘climate swerve’ may be happening as we begin to realise that it is ‘deeply wrong, perhaps evil, to destroy our habitat and create a legacy of suffering for our children and grandchildren.’

• Such ethical passion results in deepening awareness that is pooled into a shared narrative by large numbers of people.

• New York Times Lifton R J 2014
Right Brain
Sir John Soane's Museum and Library of distinguished 19th century architect Sir John Soane. At Soane's request, the house has been left untouched since his death – almost 180 years ago.
'Commodity Firmness and Delight'

• The Vitruvian ideal frequently quoted in Architecture, less so in engineering.

• In Architectural Engineering it is our joint ambition.

• What are the implications?
Human Beings
'Delight'

- The point where Environmental Engineering and Architecture converge and buildings deliver

‘Comfort, Forgiveness and Pleasure’

Is Sustainability
A trip to Seville with 20 architectural students and a thermal imaging camera

It takes time to heat an object up or cool it down.

The changes can be

‘Seasonal’

or

‘Day to Day’
PLEA

• Passive Low Energy Architecture, now a legislative requirement,

• This is our chance to understand each other, to bring together the objective and the subjective.

• We must take this chance and use it to learn to engineer beauty which lasts – creating sustainable cities to live in
Building Design

20th century

Building
- Shelter Architects and Builders

Building Services
- Comfort Engineers and Installers
Building Design

21st Century

Building Services
- Comfort Trimming
- Adaptation to change
- Specialist Contractors / FM

Building
- Shelter and Comfort
- Engineer/Architect
- Occupant / Contractor
Seasonal Heat Storage
Underground Buildings

Passive Annual Heat Storage
Heat Flow Demonstration

Ambient

Insulation

Earth

Year 1
Feb Apr Jun Aug Oct Dec

Year 2
Feb Apr Jun Aug Oct Dec

Thermal Mass Workshop: Innovative uses of mass for thermal storage in the built environment 31 May 2001
MILE END PARK
Passive Annual Heat Storage
Balanced Energy Network

1. Cold Water Heat Network
2. Heat Pumps
3. Borehole Thermal Storage
4. Demand Side Response
5. Smart Hot Water Storage
6. Low/Zero Carbon Electricity
7. Modular expansion: links to other networks
21st Century Integrated design

• It is common experience that a building can be comfortable in Spring and Autumn without Building Services

• Understanding why and the influence of fabric and construction on comfort is required to integrated design.

• Avoid building services where possible they use energy

• Work with both sides of the brain

Talk To Each Other