

CIBSE Building Simulation Group **Modelling for Compliance vs. Modelling the** **“Real” Building**

30 September 2009





Modelling for Compliance vs. Modelling the “real” Building

Overview

- Thermal modelling and compliance
- Drivers of Thermal Modelling
- Compliance and the “real” design – energy performance
- Compliance vs. “real” design – the debate
- Thermal modelling and CECM – the beginning
- Thermal modelling and the NCM
- The NCM model vs. the “real” design model
- NCM 2010 vs. the “real” design
- Summary of differences
- Questions & Answers

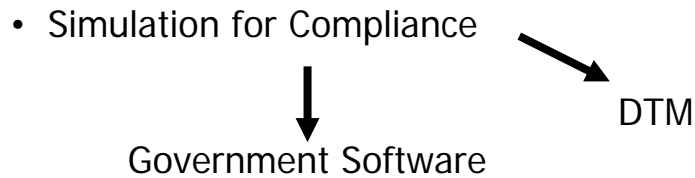
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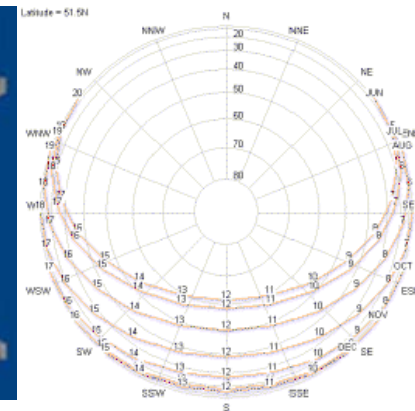
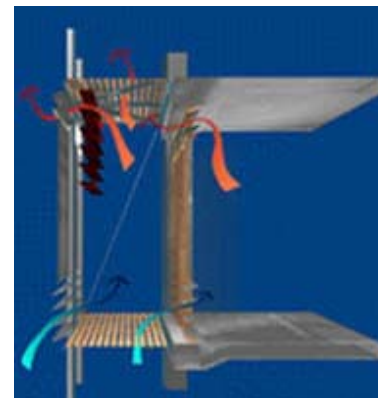
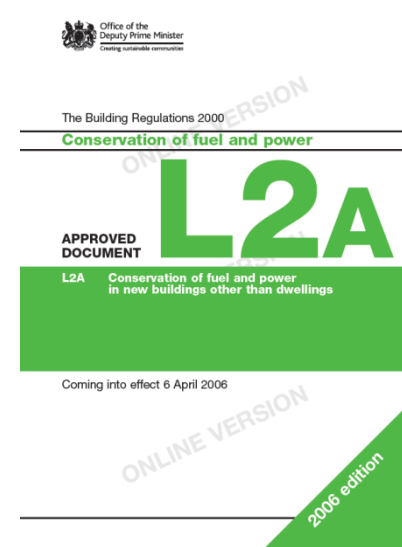
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Thermal Modelling & Compliance

- ADL2A: 2006 – compliance with Criterion 1 (NCM)
- Step change - Simulation of thermal models shifted from Design to Compliance



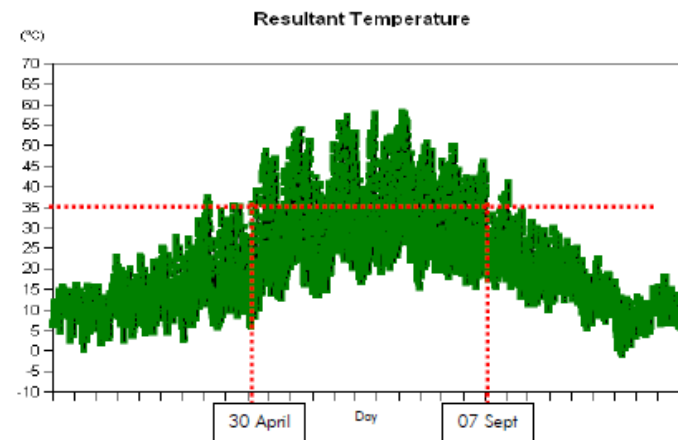
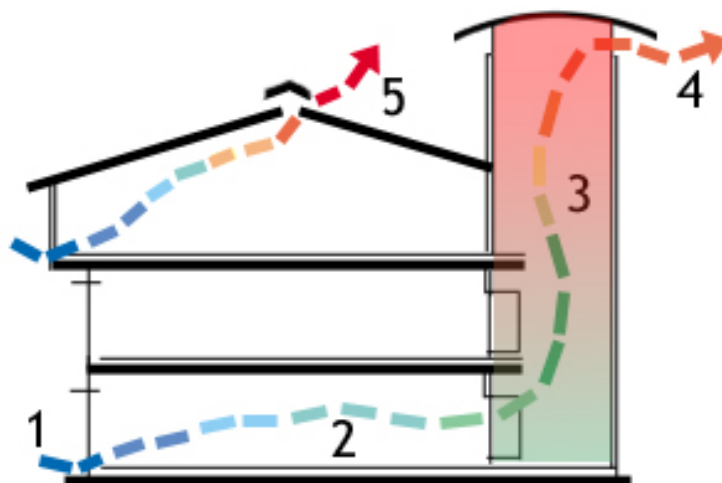
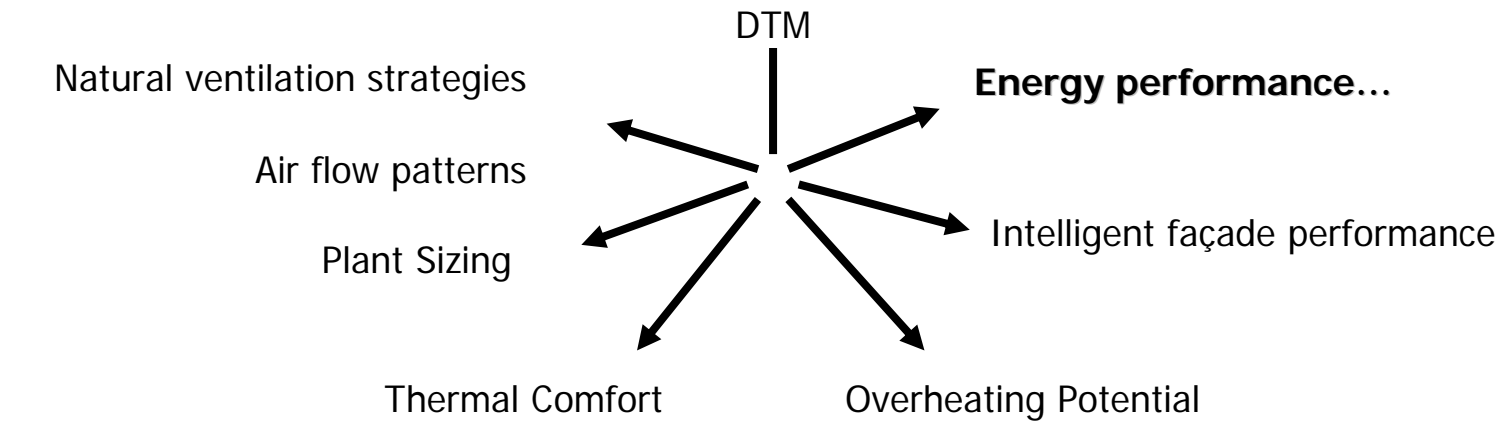
- CECM – acknowledging DTM
- Purpose of thermal modelling; CECM & NCM:
 - Holistic approach
 - Design flexibility – elemental method
 - Passive features
 - **Engineering Energy Performance**





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Thermal Modelling & The “Real” Design





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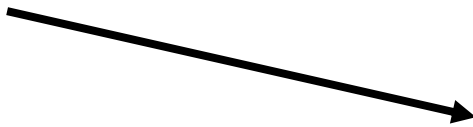
Compliance vs. “real” design – the debate

- Origin of simulation and Part L2
- The CECM



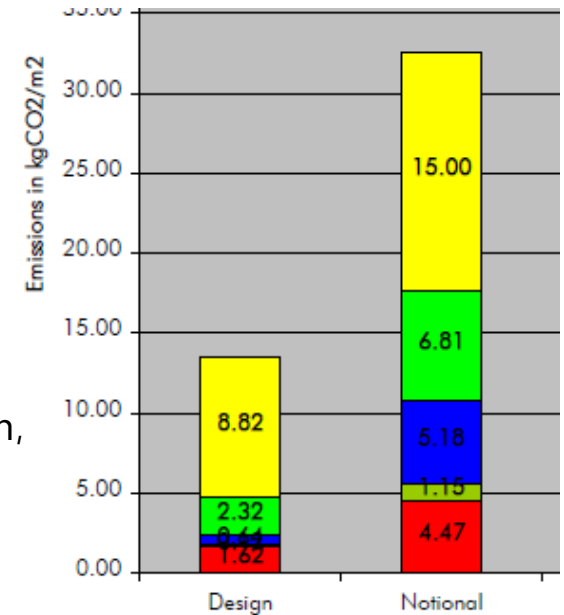
Design Thermal Model

- Actual design; shape, orientation, any feature...
- Design Internal Conditions
- Design System Performance
- Specific Weather Data
- Close representation of Actual building



Notional Thermal Model – The Reference

- Same shape, orientation, no design feature
- Specific lighting gains
- Specific System Performance
- Specific Weather Data
- Specific Fabric Thermal Properties
- Specific Glazing %





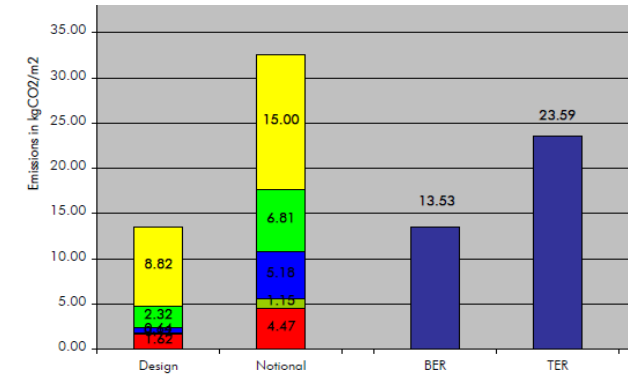
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Thermal Modelling & the NCM – the Change

- EUEPBD- standardised approach- L2A: 2006 & NCM
- Enters the term “real” design!

Requirements of EPBD - NCM

- Like for like building use – internal conditions
- NOT a design method
- Not “real” design, but rather, if the building were designed incorporating these activities...
- Modelling mandatory
- Promotes DTM
- Fabulous idea in theory, but in practice...



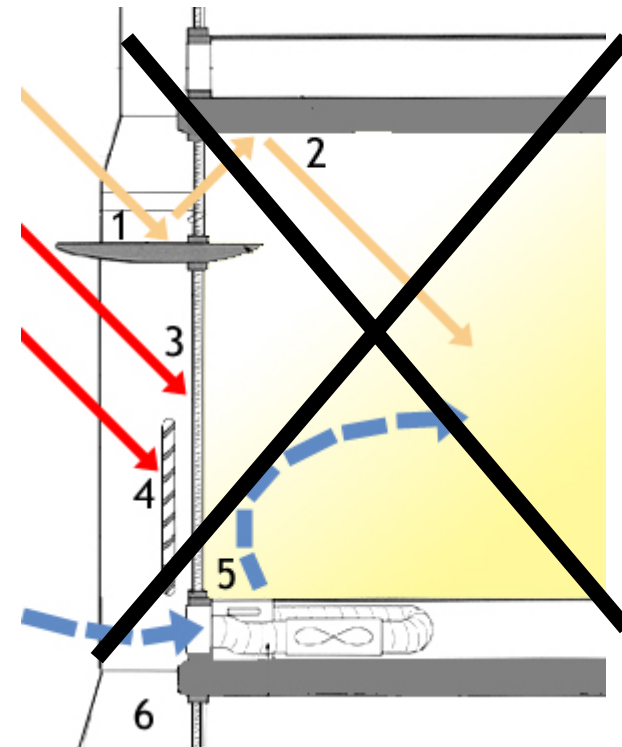
- NCM- Individual member states
- Cannot force to buy modelling tool – although different story for SAP
- In comes the free tool – Out goes DTM
- Energy performance no longer an engineering exercise, merely tick-box



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Limitations of the NCM V3.4 & the Free Tool

- No design measures e.g. displacement ventilation
- Mixed mode ventilation
- Intelligent facades
- Limited database of internal conditions – year round cooling
- Flawed fan/pump power calculations
- No night cooling
- Limited effect of thermal mass...





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Backward “Progress”

- ✓ Scrap elemental method
- ✓ Holistic approach including climatic conditions and all features
- ✓ Ideal for DTM
- ✗ NCM determined using a flawed tool – limited consideration of all considerable features – NOT really holistic!
- ✗ Why bother DESIGN external shading? Tick the box!
- ✗ Daylight optimisation – really? Ticking is simpler
- ✗ Ventilated facades? Sorry...
- ✗ Night cooling/thermal mass?
- ✗ Mixed mode ventilation?
- ✗ Fresh air optimisation?

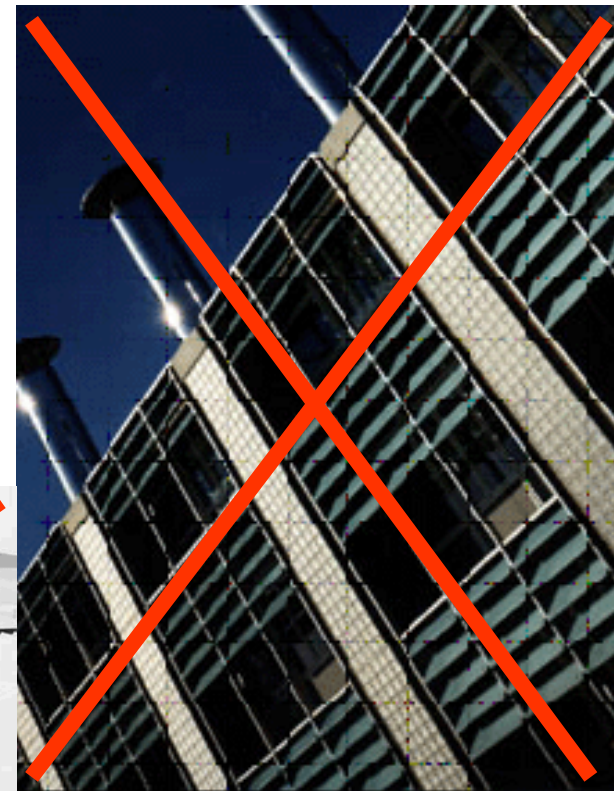
But this is the SIMPLE tool – fair enough

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Backward "Progress"

- ✓ DTM still Approved
- ✓ Until NCM V3.4 further limited design features
- ✗ The Simple tool cannot do it, so restrictions should apply!
- ✓ Approved DTM still allow daylight modelling, external shading, and some extent of thermal mass...





Summary – where we stand

Compliance Model

- Initially Design Model vs. Notional Model
- Currently NCM Design Model vs. Notional Target
- NCM design not accurate reflection of “real” design model
- NCM conceived using the SIMPLE tool
- NCM lacks design flexibility
- Still a step further than elemental method
- Compliance method still not fully promoting Engineering of Building Performance

The “Real” Model

- More design flexibility
- More accurate performance prediction under likely scenarios
- More relevant to advise on CO₂ and energy-saving measures
- More accurate for plant sizing, LZC technology sizing etc...



Summary – what next

L2A: 2010 – the Aggregate Approach

- Further reduction in TER
- Edging closer to Zero Carbon Buildings
- **Yet more engineering required especially for side-lit (common) buildings – serious reduction in CO₂ required**
- Compliance model should be closer to reality
- Hardly any design is “simple” anymore
- Unfortunately, NCM 2010 still derived by the SIMPLE tool

Proposals for amending Part L and Part F of the Building Regulations – *Consultation*

Volume 2: Proposed technical guidance for Part L



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Thank You!

Q & A

