Analysis of the first and lifetime cost benefits of increased insulation to 2010 and 2013 levels

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Value Proposition

What are “Optimal Cost Building Solutions”? A building design that seeks to reduce:

- Whole building capital cost (Capex)
- Whole building lifecycle operation cost (Opex)

[Graph showing the trade-off between Capital Cost (Capex) and Operational Cost (Opex)]
Value Proposition

What are “Optimal Cost Building Solutions”? A building design that seeks to reduce:
- Whole building capital cost (Capex)
- Whole building lifecycle operation cost (Opex)

Developer
Why should I build an Optimal Cost Building?

Tenant / Occupier
Why should I lease an Optimal Cost Building?

Owner
Why should I own an Optimal Cost Building?
Building Types

Speculative Office

Heated (22°C) and cooling (24°C) 7am – 7pm, 7 days a week

Large Supermarket

Heated (20°C) and cooling (23°C) 8am – 6pm, 7 days a week

Retail Warehouse

Heated (20°C) and cooling (23°C) 8am – 6pm, 7 days a week

Distribution Warehouse

Heated (18°C) no cooling 24 hours a day, 7 days a week

CIBSE Technical Symposium Paper
NZEB Roadmap

Part L 2010
Part L 2013
40% improvement on Part L 2010
50% improvement on Part L 2010
NZE

CIBSE Technical Symposium Paper

http://www.kingspanpanels.co.uk/why-kingspan/value-proposition/

EnvelopeFirst & Optimised Building Services
Insulate & Generate Integrated LZC Technologies
Net-Zero Energy Buildings (NZEBS)
Locations

- Newcastle
- Manchester
- London
Pretext – Complex Interaction

Costs

Benefits

Increased insulation thickness
Pretext – Complex Interaction

Costs

Benefits

Increased insulation thickness

Reduced energy costs
Pretext – Complex Interaction

Costs

Benefits

- Increased design flexibility
- Reduced plant sizes
- Reduced energy costs

Increased insulation thickness
Method

- Dynamic thermal modeling
  - IES Virtual Environment

- Dynamic cost modeling
  - Takes account of interactions between different design inputs
  - E.g. increased insulation $\rightarrow$ reduced plant sizes
  - E.g. more efficient lighting $\rightarrow$ reduced cooling demands

- Whole life cost calculation
- Future energy costs
- Plant replacement costs
Methodology

Create and run thermal models for individual measures → Create capital cost model → Rank individual building improvements in order of cost effectiveness

Identify cost optimal solution for each scenario → Create whole-life cost model → Create models for each carbon target and fabric specification
Drivers

- Economic
- Rising Energy Prices?
- Property Return
- Energy Security

- Environmental
- Climate Change
- Pollution

- Social
- Legislation
- Corporate Image
Results – Capital costs

- Small differences in capital cost

- When complying with Part L 2013 the most cost effective fabric specification is the Notional

- Tighter carbon targets make increased insulation more economic

- Improving from Part L 2010 to 2013 costs between approx. 1.6% more or saves approx. 0.1% depending on how go about it

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Different energy price forecasts made only small differences because cash-flows are dominated by plant replacement costs.

45 of the 72 scenarios show a favorable NPV.
Calculated capital cost of enhancing the fabric standard whilst achieving Part L 2013 compliance is between £3,000 and £18,000.

Two of the curves rapidly fall below the horizontal axis by years 8 and 13.

This is achieved through reduced plant replacement costs.

### Results – Cumulative Net Present Values

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<th>Backstop to Enhanced 2013</th>
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Cumulative Net Present Value (NPV)

- £350,000
- £300,000
- £250,000
- £200,000
- £150,000
- £100,000
- £50,000
- 0
- £50,000
- £100,000
- £150,000
- £200,000
- £250,000
- £300,000
- £350,000

Graph showing cumulative net present value over years 0 to 40.
The effects of changes to building specification are complex

Changing one element can have knock on effects which should be carefully considered

Enhanced insulation levels have a number of benefits, some are more obvious than others:
- Reduced energy costs
- Reduced plant sizes
- Increased design flexibility
- Reduced plant replacement costs
Thank you – Questions?

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