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Routes to Low-Carbon refurbishment and green retrofit - a 'Rough Guide'

Derby University Case Study

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Why go ‘Green’?

- Legislation
- Brand enhancement
- Staff influence
- Customer expectation
- Existing publicly stated commitment
- Financial ‘benefits’
- Incentives
- An altruistic desire to act responsibly
- Future proofing – energy price volatility

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Why aspire to a ‘rating’?

- Adds legitimacy
- Provides a framework
- Associated brand values – e.g. RICS / Ska
- Benchmarking
- Future-proofing – incremental improvement

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Which system to choose?

- What are you trying to achieve?
  - Tangible, measurable, independently assessed outcomes
  - Window dressing
  - Both
- Communication strategy
- Resource commitment
- In-House expertise

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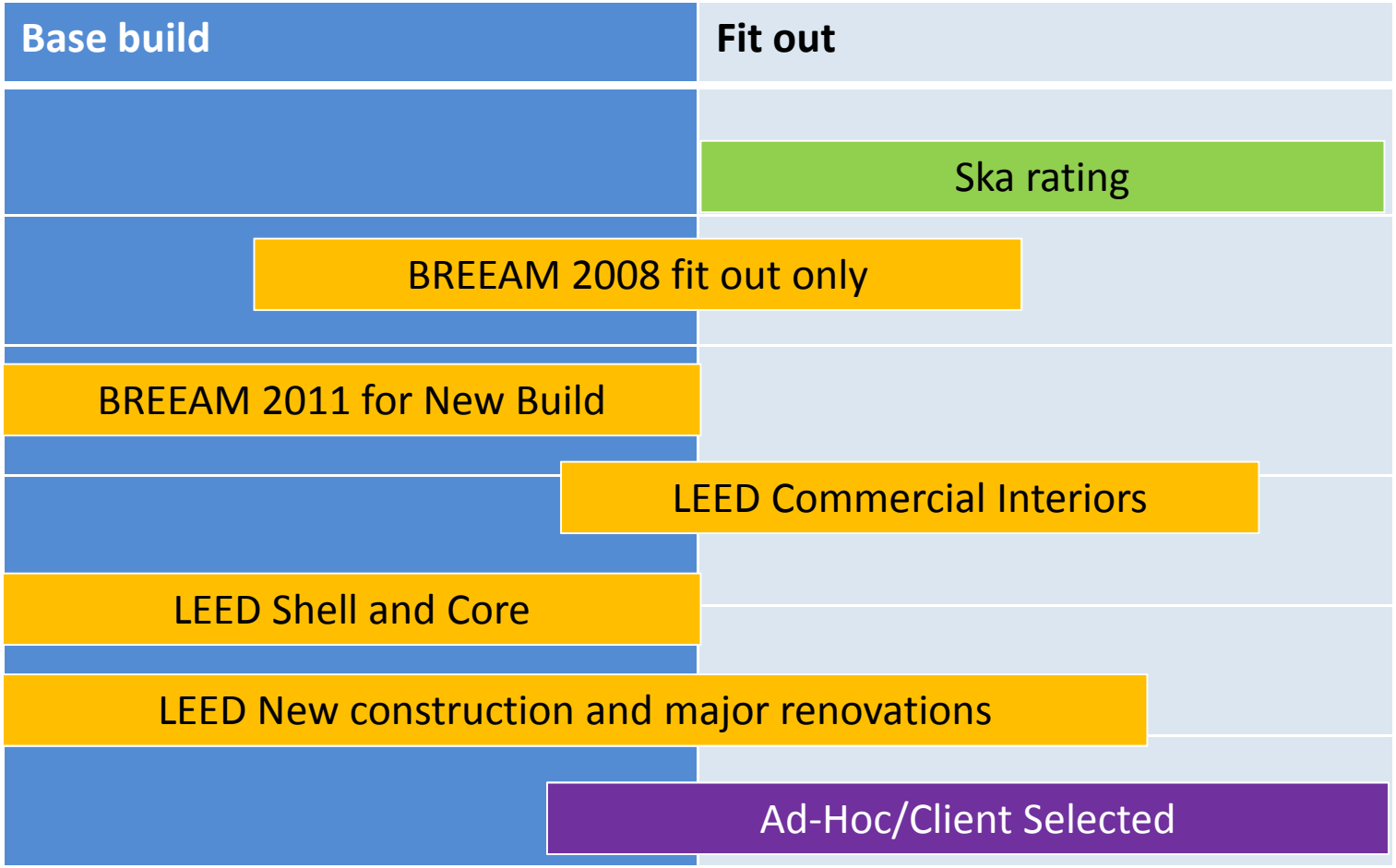
What's Available?



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Which to select

Framework	Overview	Pros	Cons
BREEAM 2008 (Fit-Out)	• BRE initiative • 49 'Issues' across 9 categories • Links 'In-Use' to Construction • Weighted Average basis • Focus on Energy Management	• Established • Credible • Construction focus (hard wired)	• Fit out a 'development' of New Build
LEED CI	• US Green Building Council initiative • 6 Themes • 4 Standards • Weighted Average basis • Design; Operation; Construct	• Global brand • Encourages Innovation in Design • Regional Slant • Widely adopted • 3rd Party accreditation - independent	• US centric > Global • 3rd Party accreditation - incurs fees

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Which to Select (cont.)

Framework	Overview	Pros	Cons
Ska Rating	• RICS initiative • On Line tool • Assessor accredited • 104 'components' across 8 env. issues • 3 Ranks – gateway achievement required	• Fit-Out dedicated approach • Occupier centric • Cost of Use • Straightforward • More flexible in achieving compliance	• Limited global reach • Relatively new/unknown • Not fool-proof in preventing less sustainable practices
Ad-Hoc / Client Selected	• The client elects which measures matter, which elements are most relevant, which 'catch their eye'	• Highly tailored - by definition	• No associated brand values • Unstructured therefore lacks on-going rationale • Tends to focus on 'novel' or 'trendy' technology - e.g. wind turbines • Harder to demonstrate credibility

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Selection Criteria

- They are all, to an extent, flawed
  - Complex e.g. DECC 17sheet workbook…
  - ‘Single’ / ‘Soapbox’ Issue
  - Lack cohesive link between green impact v lifecycle cost v business case
  - Poor metrics/communication to facilitate easy, informed choice by inexpert decision makers
  - Smell like snake oil PV; wind turbines, feed-in tariffs

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Selection Criteria (cont.)

BREEAM 2008 F/O Weighting		LEED Comm Int. Weighting		Ska Measures	
Managing	13	?	0	?	0
Health & Wellbeing	17	Indoor Env. Quality	17	Wellbeing	12
Energy	21	Energy & atmos. (CO_2)	37	Energy Use	22
Transport	9	Sustainable Sites	21	Transport	3
Water	7	Water Efficiency	11	Water Use	12
Materials	14	Materials & resources	14	Materials	27
Waste	8	Const. Waste Man.		Waste	18
Pollution	11	?	0	Pollution	6
Innovation	+10	Innovation & design	+6	Other	+4
?		Regional	+4	?	
Total	110		110		104

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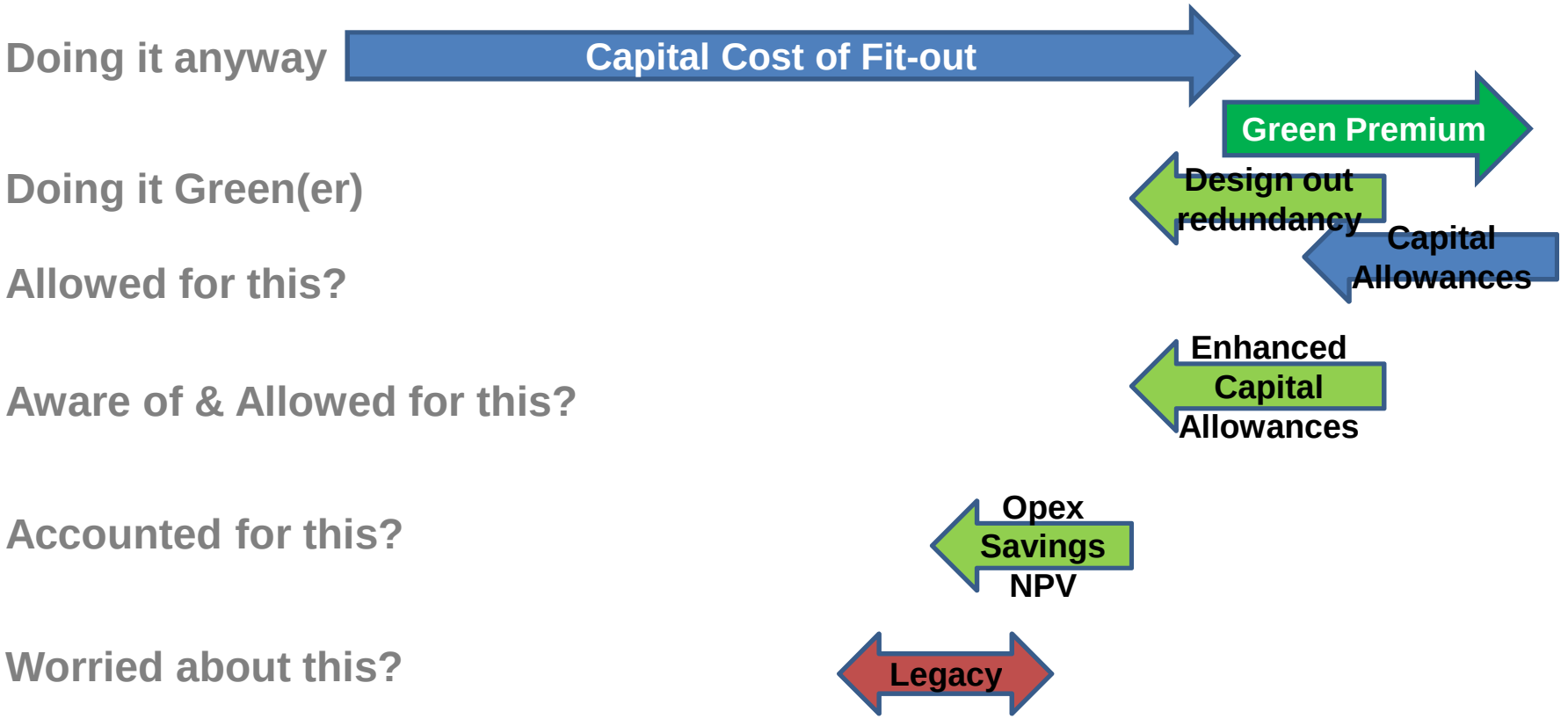
What does it cost? NPV Capex / Opex



Not to Scale!

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Inherent Inertia…

- Cat A v Shell & Core – the *40%* 'Agency' effect
  - It is 'reported' that [up to] 40% of Cat A works are discarded at 'Cat B' phase (non attributable)
  - Compare 'WRAP' outline Waste 'Good Practice' savings of 0.35% - 0.53%
  - Implications on embedded Energy, Water, CO_2 ……..
- Carbon/Water/Energy savings linked to Capex + Opex impact to mitigate the 'premium'
  - Poor metrics

Sustainability

... a collective responsibility

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Derby University Case Study

- What is a ‘Sustainable’ project?
  - Ideally delivers **nett** improved energy, CO2 and water utilisation performance during the project execution, occupation and reinstatement phases
  - Is close to cost neutral or even cost positive over the lifetime of the project
  - Creates an improved environment for the building users and adjacent community
  - Does not impede the normal operations of the occupier as a result of ‘sustainable’ choices

Sustainability
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Derby University Case Study

- One of Four major schemes undertaken at Derby so far; one new scheme imminent
- Refurbishment of 3 ‘well used’ 1960’s tower blocks – driven by operational and aesthetic objectives
  - Green Theme ‘to improve energy efficiency’ – 50% reduction
  - Refenestration – 10,000 m^2 of replacement glazing
  - Full interior upgrade
  - Budget of £13.5M; 18 month programme
  - Includes additional £1M for ‘alternative construction methods’ to reduce noise
  - Executed under ‘Considerate Contractors’ programme
  - Heating systems upgrade to optimise achieved new U value performance

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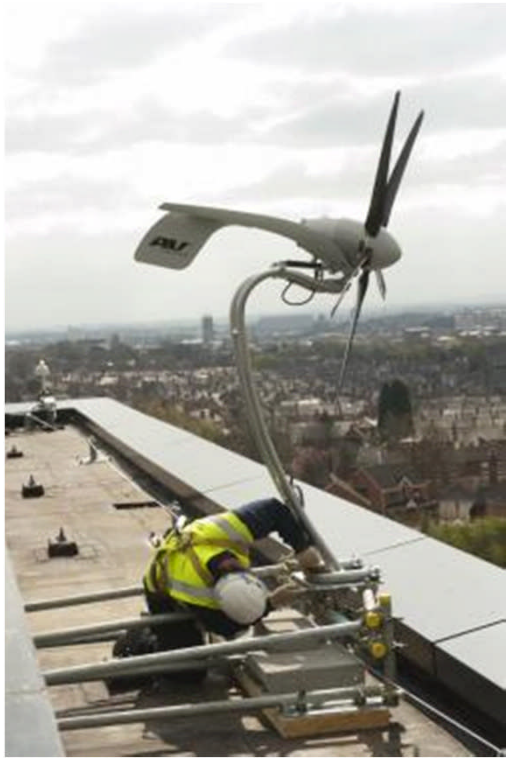
Derby University Case Study - additional ‘Green’ measures

- £266k investment…payback…
  - 1-5 years / outwith lifetime of kit
- 200 m^2 of Photovoltaic Cells
  - 19 kw/h generation capability
- 9 ‘roof borne’ wind turbines
  - 9,4 kw/h
- 1 new 65 ft. tall ground based Wind Turbine
  - 3,05 kw/h
- green energy generated by the three projects will reduce carbon dioxide emissions by 18 tonnes p.a.



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Derby University Case Study - Outcomes

- 300% improvement in heat retention
- 250% improvement in solar gain reflection
- £150k per annum energy savings
- Shortlisted in the 2010 Times Higher Education Awards in the category of 'Outstanding Contribution to Sustainable Development'

"The towers project has vastly improved the look of the University's Kedleston Road site and, just as importantly, its energy efficiency.

Ian Willgoose, Director of Estates

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Westborough Primary School

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Westborough Primary School

- £1.4 refurbishment project
- £500k grant from DCSF Zero Carbon Task Force
- Plans were based on children's vision for a sustainable future
- Part of Balfour Beatty's "Towards Sustainable Schools" research programme.
- Incorporated internal wall insulation, renewables, energy efficient technologies, rainwater harvesting, and water saving technologies into an Edwardian building.

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Westborough Primary School

Design Solutions	Annual CO_2 Savings
Biomass Boiler	30 tonnes
Photovoltaic panels	7 tonnes
Energy efficient lighting/ICT & appliances	15 tonnes
Thermal insulation, double glazing & passive systems	15 tonnes
Total	67 tonnes per annum

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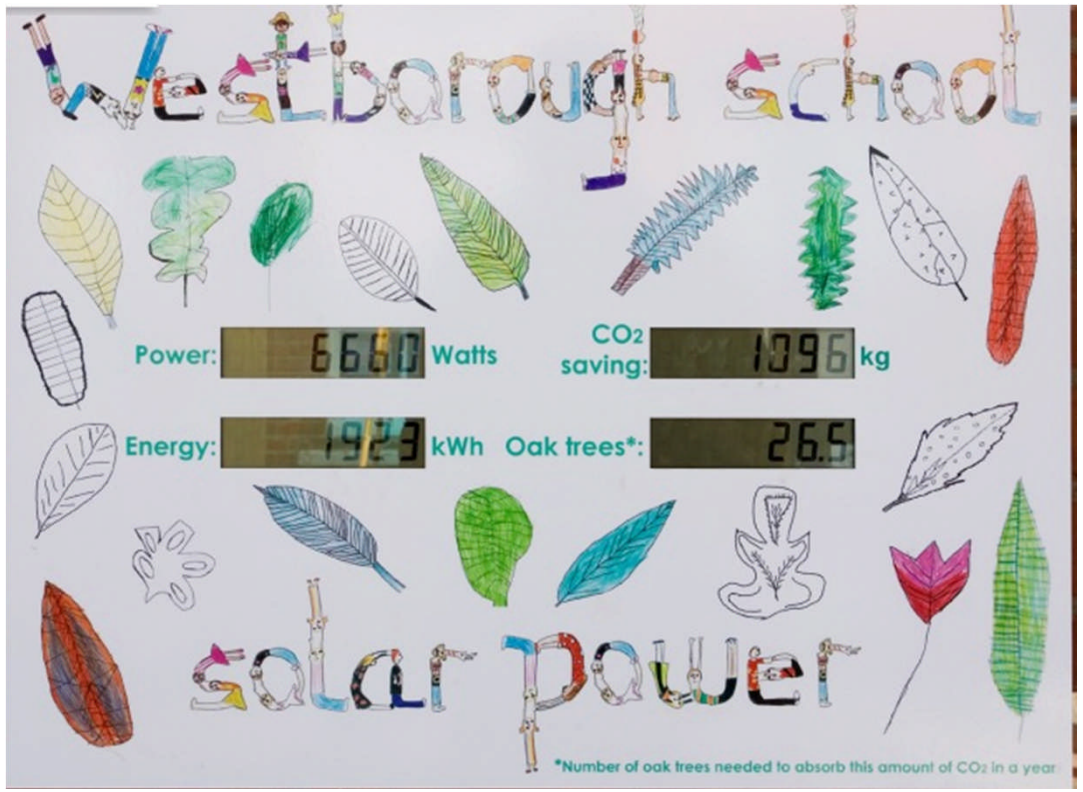
Results

- Expected to achieve 66% savings in CO_2kg/m^2/annum
- Approx. 70% lower than similar schools
- Greatly improved comfort levels through improved insulation
- Enhanced learning environment for teachers and students
- Improved acoustics allow the assembly hall to be used as a community space generating income for the school.



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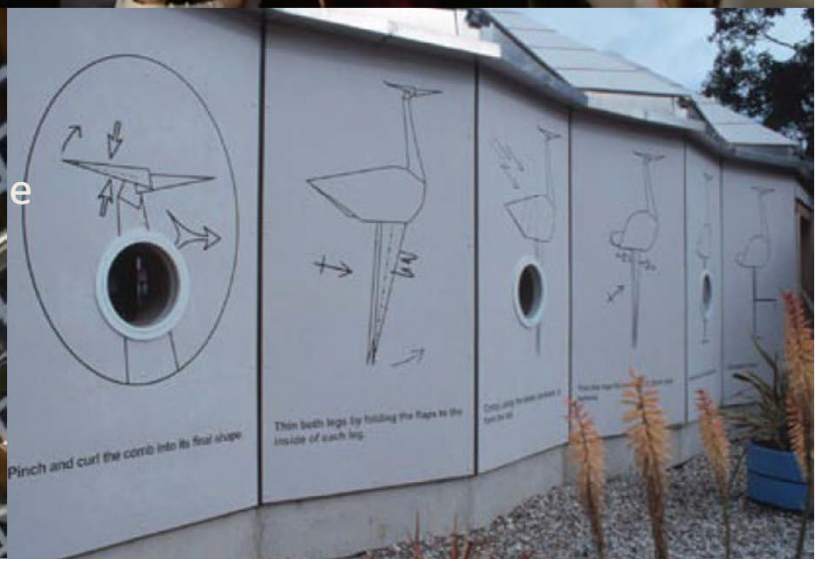

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