

- · It is very important that students are aware of the key issues regarding sustainability in architecture in order to learn how they can incorporate into their design proposal from the initial stage.
- So your lectures in week 3 and 4 is perfect timing considering they are at very early stage of design.

- 1<sup>st</sup> seminar Energy
- 2<sup>nd</sup> week Resource Efficiency

- Business as Usual: missing all the global targets Building Regulations, SAP, SBEM, IES Voluntary standards: EcoHomes, RREEAM, Code for Sustainable Homes, Code 6 and Industry response Zero Carbon Nub: Outputs, missed opportunities and dropped targets Driving down demand: SuperE, AECB, PHPP, Minergie, Carbon Lite, EnerPhit, One Planet Living: 10 issues Calculators: Areas, Temperatures, U values, Energy demand, elemental %, fuel choice, Carbon Planet Los through glass: Calculators Thermal Mass and los strough glass: Calculators Thermal Mass and los through glass: Calculators Thermal Mass Provide Thermal Frank / Thermal Finking > Thermal Insulation Thermal Insulation: Conductivity, Convection, Radiation, Wind wash Fabric-First, Service-Last

- Fabric-First, Service-Last Wind and Air tightness: Built-Tight, Ventilate-Right
- Moisture Permeability: Vapour-Closed v Vapour-Open (EV Overheating: Build-Light, Insulate Right, Scien-Tight Ventilation/Cooling: Passive v Active v Mechanical v A-C

#### Sustainability Definitions

- What does sustainability mean to you?
- · What is your definition?
- · Most people do not know or understand Sustainable and cannot define it
- What is the difference between
- **Environmental and Sustainable?**
- Sustainable = Economic + Social + Environmental in equal measure or in balance © GBE Lecture 2016 Energy Efficiency

#### Economic = Takes profit into account.

- Business as Usual = Profits before People before Planet
- Business as Usual = Missing all the Global Targets Fiduciary Rules apply = Make a profit for your
- shareholders (but at what cost?)
- Some tell porkies (greenwash) to sell more
- WW and others have been caught out (but some customers remain loyal to brand) But Monsanto (GM seeds) John West (Tuna) Tesco (Food) Martel (Barbie and Ken) Lego (Bricks) and others have learned that they cannot ignore customers (and non-customers) when they join forces through social media campaigns

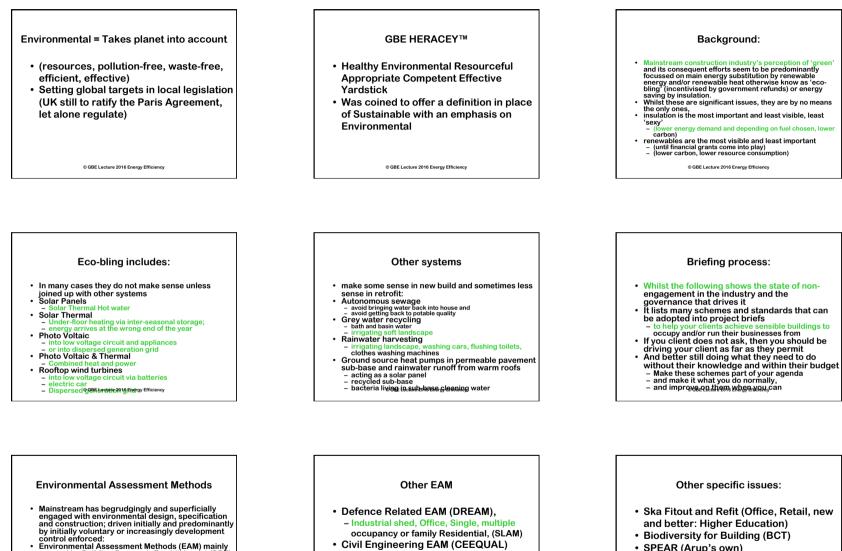
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### Social = Takes people into account

· (They are your business, Health and Wellbeing, Living wage+, Prosperity, Local)

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- control enforced: Environmental Assessment Methods (EAM) mainly created by Building Research Establishment (BRE) EcoHomes (now only Scotland) Code for Sustainable Homes (CfSH) Code 6 and industry response One up man ship (BRE Innovation Park) Efficient of demonstrate Incompetence reigned

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    - © GBE Lecture 2016 Energy Efficiency

- (Now BREEAM Infrastructure)
- Health building EAM - NEET now BREEAM Health
- Most reinforced by reference to BRE's Green Guide to Specification (GGtS). (more about GGtS tater) .....

- SPEAR (Arup's own)
- Other inter/national schemes: - GreenStar (Aus), LEED (USA), etc.
- WELL (USA Health and Wellbeing) One Planet Living: 10 issues

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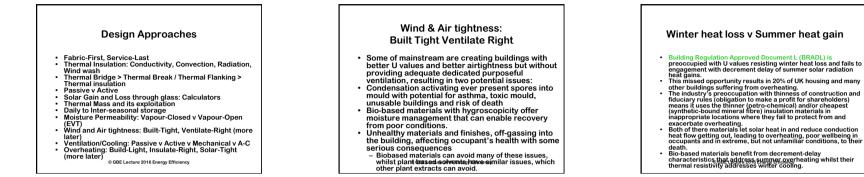


- Bio-based materials with hygroscopicity offer moisture management that can enable recovery from poor conditions or poor construction.
- Bio-based air-tightness membranes can let the building breath and lose any interstitial condensations: Lecture 2016 Energy Efficiency

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- Lack of understanding
- Poor detailing
- Weak specification
- Skills but lack of care
- Inevitable:inadequate:construction;

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#### **Refurbishment Failed & Abandoned Schemes**

- UK's GreenDeal (Energy Focussed Domestic Refurbishment) and Energy Company Obligation (ECO) have been carrying out whole house external insulation to reduce heating demands, in tens of thousands of houses.
  There are examples of blatantly ignoring thermal bridges created at services interfaces, perimeters and abutments.
  These will inevitably lead to water penetration, surface or interstitial condensation and mould and subsequent ill-health of occument ill-health of

- Bio-based materials with hygroscopicity offer moisture management that can enable recovery from such poor
- conditions. Historic fabric which is characterised by porous materials and noisture permeable construction including solid matching need moisture transport, hygroscopicity and breathing insulation/cladding/lining systems to avoid the risk of rot, frost amage and mould
- Bio-based materials have these characteristics in abundance.

#### **BRE Green v Green Green**

- BRE also contributes to failures by 'forcing' designers to specify methods of construction using conventional materials from those listed in GGtS.
- GGtS uses Life Cycle Assessment (LCA) as its criteria for Greenness. GGtS also openly ignores important alternatives including bio-based materials and methods of construction.

- based materials and methods of construction. The consequence is high embodied energy and embodied carbon new additions to the housing and other building stock. Bio-based materials sequester carbon dioxide during growth and after manufacturing processing these materials remain carbon negative and enable carbon negative building in
- construction. Bio-based insulation materials offer low embodied energy and
- carbon in manufacturer as well as low energy and potential low carbon buildings in use, most other materials cannot cla both © GBF Lecture 2016 Energy Efficiency

#### 1/2 W 2 L > Unhealthy Products

- Recent drives to reduce waste to landfill, mean a lot of materials are recycled into new products, reclaimable and waste wood turned into wood panel products bound together with synthetic petro-chemical binders or adhesives. Manufacturers are persistently required to respond to requests

- Manufacturers are persistently required to respond to requests for cheaper goods.
  They inevitably resort to strong chemicals to deliver cheap completent materials.
  Torganic Compounds (VOCs) into the surrounding air leading to indoor air qualitly (AQ) issues.
  Combine that with airtightness and poor ventilation this leads to very unhealthy conditions and ill-health.
  Bio-based materials can avoid many of these issues.
  Whilst pint based solvents do have similar issues, bio-based extracts can avoid more of these issues whilst bonding ingredients.

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#### MMC reduces waste allegedly

- Current preoccupation with Modern Methods of Construction (MMC) are seen to solve one of the housing problems in the UK: 'demand outstrips supply' which results in prices of new homes being driven up
- This issue will not be solved unless developers are willing to drop their insistence on high profit margins and their reluctance to build until the demand is high and profits maintained

#### Offsite prefabrication is seen as a means to:

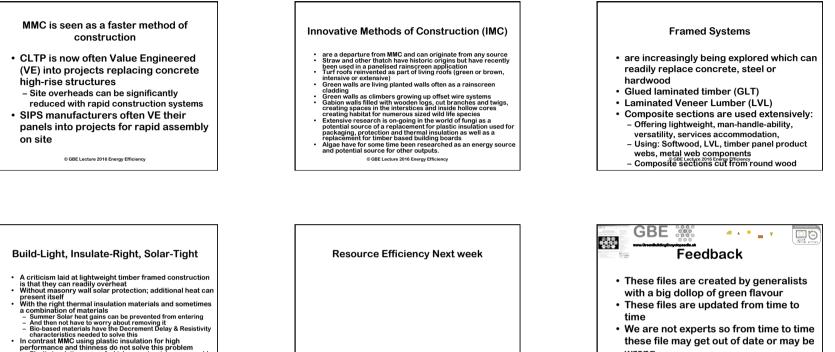
- Build fast on site, (plus corresponding) manufacturing time in the factory)
- Build more punctually on site, despite the weather
- · Manufacture more reliably, competently and assemble more simply on site (but rarely cheaper)
- · Build with less waste on site
- Assuming it has been designed to minimise
- waste, acknowledging the size of stuff
- Assuming the factory is also run on lean, waste-free principles

#### Timber is an obvious choice for 'cut-on-site' but also for MMC in a variety of technologies:

- Light timber frame (LTF) including: **Insulated Structural Panel Systems** (ISPS)
- Structural Insulation Panel Systems (SIPS)
- · Solid Wood Systems (SWS) including: **Cross laminated Timber Panel (CLTP)**

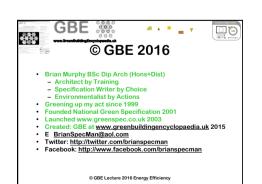
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 Plastic insulation some of which are not molitor to insulation.
 Plastic insulation some of which are not moliture permeable create barriers to molisture transfer through walls, floors and roofs, the only way out for moisture vapour is through timber framing which then becomes vulnerable to failure

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wrong.

 If you feel that we have got it wrong please let us know so we can put it right

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