

SUSTAINABILITY FORUM – RECORD OF DEBATE

Topic	This forum believes that passive solar architecture is dead
Date	17 March 2005
	

<p>Attendees</p>	<p>Chair: Max Fordham Speakers: Brendan O'Neill – ONKO Architects Jonas Lencer – dRMM Architects Daviod Turrent – ECD Architects Peter Clegg – Feilden Clegg Bradley</p> <p>Andres Luque - Alan Baxter & Associates Tim Attwood - Alan Conisbee & Associate Josie Winch - Archadis Jake Hacker - Arup Nick James - BioRegional Ben Gill - BioRegional Lynne Sullivan -Broadway Malyan Rod Bunn - BSRIA Henriette Helstrup - C F Moller Architects Maurice Friel - C F Moller Architects Elisabeth Kendall - C F Moller Architects Andy Nicholls - C F Moller Architects Teva Hesse - C F Moller Architects Richard Nightingale - Cullum Nightingale Nick Campbell - CZWG Architects Stephen Rigg - CZWG Architects Alan Brock - DfES Ivan Rodriguez - Downie Consulting Paul Downie - Downie Consulting Suzie Baker - ECD Architects James Roach - Edward Cullinan Architects Hannah Routh - Energy for Sustainable Development Jenny Juritz - GHM Rock Townsend Chris Grasby - GHM Rock Townsend Andy Brown - Cambridge Architectural Research Gary Clark - Hopkins Architects Maureen Trebilock - University of Nottingham Gordon Evans - PCKO Architects Insun Cha - Green Cole Thomson Associates Ruth Edwards - Bare Projects</p>	<p>Colin Clarke - Equion Tim Harris - Expedition Engineering Ruth Hopgood - Expedition Engineering Ben Godber - Expedition Engineering George Oates - Expedition Engineering Craig Anders - Green Cole Thomson Associates Tom Gibb - Haverstock Associates Haydn Thomas - Haverstock Associates Steve Burford - HBG Design Jude Harris - Jestico & Whiles Sarah Marshall - McDowell & Benedetti Chloe Street - McDowell & Benedetti Simon Tilleard - Natural History Museum Kevin Rellis - Natural History Museum Christel Wanten - Nicholas Hare Architects Sue Roaf - Oxford Brookes University Peter Chlapowski - PCKO Architect Charles Thomson - Rivington Street Studio Architecture Douglas Pow - Techniker Megan Yates – Techniker Mike Henley - Thistle Hotels Martin Ricketts - Urban Catalyst Jin Lu - UCL Manal Bashir - PRP Architects Mike Jenkins - Wharf Developments Ltd David Bellis - office bd+u Umberto Emoli - office bd+u David Marshallsay - GHM Rock Townsend Alfonso Natellio - GHM Rock Townsend Chris Shirley-Smith - Waterworks Robert Champion Richard Toy - Natural History Museum Julian Williams - ECD Partnership Christoph Helmus Roddy Langmuire - Edward Cullinan Architects Barry Edwards - Bare Projects</p>	<p>And from Fulcrum:</p> <p>Andy Ford Brian Mark Clare Wildfire Gwen Mark Henrietta Lynch James Hepburn Martin Rockport Natasha Eyre Peter Mark Peter Nissen Richard Shennan Victoria Caesar Clare Manley Dee Cummings Nick Boid Greg Byrne Saud Muhsinovic Jamie Coffey Kevin Bishop Tessa Parnell Xaran Fueyo Nick Barker Dean Viapree</p>
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The vote

Before the debate, an initial show of hands indicated that there were 14 in agreement with the motion 'that passive solar architecture is dead' and 30 (approx.) against. During the debate it became clear that the motion needed clarification:

"Passive solar architecture in terms of 'aim to capture solar energy as heat (as opposed to light) through windows in a building in the UK climatic zone' is dead."

The debate managed to persuade an extra four people that this type of architecture was dead. -Not nearly enough swing to pass the motion much to the dismay of the engineers present!

The case for 'Passive Solar Architecture is dead'.

Speakers: Brendan O'Neill (ONKO Architects), Jonas Lencer (dRMM Architects), Brian Mark (Fulcrum Consulting).

- What needs to die? Design briefs with a rigid "passive solar" design requirement. These requirements are slowly creeping into planning 'design codes' under the umbrella of "sustainable development" in the UK.
- What are the "passive solar" design codes? (BRE General Information Report 27).
 - Dwellings orientated to maximise passive solar gain (ie. align within 30° of south)
 - Living and bedrooms to be located on south facing elevations
 - Avoid obstructions to maximise solar access to windows.Using the most favourable data on occupancy, UK climatic conditions, B-regs, Part L compliant, TAS dynamic thermal modelling shows that the maximum saving is 61 Kg CO₂/ annum on a 65m² flat. -The equivalent of a hundred watt lightbulb for 3 hours/day or £4.30/annum. This is the best case- an average case would show a nett increase in CO₂ requirements because of heat losses over the majority of the year at times when residential buildings are in use. The widely held belief that passive solar design can reduce demands for fossil fuel driven energy in urban, high density housing is a myth!
- Moving away from the scenario of one-off individual buildings on unconstrained greenfield sites. - In order to regenerate urban areas in the most sustainable way, all new developments need to be high density, loose fit and low energy. In terms of cost and environmental impact, this will mean more 'high rise' mixed-use buildings. If orientational constraints are placed on new developments then it will be difficult to achieve the high density. -Dual aspect planning achieves higher housing density than single aspect so solar architectural constraints will mean a greater land requirement.
- There are major problems with applying passive solar design to masterplanning.- particularly extensions of the urban fabric where increased density is required in areas where there are already established patterns of use.-Where topography or the need for particular views demand compromise with the principles of passive solar design. Solar driven architecture in this context becomes unrealistic.
- Do sun spaces really work? Do they overheat and in practice do they just take up space that can be better used in a dwelling?
- A passive solar building without solar shading will overheat in summer. It will need cooling. This may be with external shades that are expensive and incur high ongoing cleaning costs. The alternative is retro-fitting domestic comfort cooling systems that will involve high energy (high CO₂). i.e.-not sustainable.
- Solar architecture is a 'one trick pony' -failing to deliver low energy or high density and will lead to the same conclusions and mistakes that typifies a significant proportion of twentieth century development.
- The requirement to orientate towards the south leads to a monochromatic solution and lacks the richness that can be achieved by east-west orientation.
- For energy saving there are more fruitful avenues to explore.
 - Designing buildings to anticipate and accommodate change. Investigate how buildings can be flexible
 - Design for technological advancements. Use architectural skills to improve ease of use of controlling new technology. -This will help buildings to work better using less energy.
 - Design with new 'agile' materials such as ETFE roofs that inflate or deflate in reaction to light levels and can instantly react to heat loss and glare. -A more 'active' and controllable form of 'solar architecture'.

The case against 'Passive Solar Architecture is dead'

Speakers: David Turrent (ECD Architects), Peter Clegg (Feilden Clegg Bradley Architects) , Andy Ford (Fulcrum Consulting)

- For thousands of years, passive solar architecture has provided the vernacular solution to providing comfort in buildings. From American Indians, Greek and Roman to Soane, Paxton and Frank Lloyd Wright, it is clear that an understanding of solar geometry in the design of buildings results in the creation of beautiful, comfortable spaces.
- Passive solar architecture had been forgotten with the advent of the modern movement but with the need for sustainability, this key element has been rediscovered.
- It is true that early solar designs were not good in the UK. They were trying to do too much and were too simplistic.
- We need to maintain solar architecture as a central tool and continue to build on our knowledge on how best to admit, filter and reject solar radiation.
- A raft of studies, based on schools, from the Tudor Walters report in 1918 to the present day has proved the beneficial effects of daylight on learning outcomes.
- If we go down the route of excluding sun light from buildings and depend on mechanised/ electrical methods of giving heat and light then we will have dead architecture. A future of mechanistic buildings is not the ideal
- Seville Cathedral is a good example of how passive solar architecture can work well in providing energy (heat, as well as light) to a building. It has a high thermal mass and so a lot of heat storage capacity. A building needs to be able to respond to sun heat over a period of time. -The sun does not work as a controllable instantaneous heat source.
- The native American Indians of Mesa Verde, Colorado are an example of collections of buildings positioned in a way that take advantage of the heat from low angled winter sun whilst being protected from the intense heat of the high summer sun.
- The courtyard house, developed by the Greeks, now a model of domestic architecture throughout the Mediterranean, optimises both passive heating and cooling. The courtyard concept is one that has not yet been fully explored in the UK, and may, particularly if temperatures rise, offer future solutions.
- The ultimate passive solar house is Frank Lloyd Wright's Wisconsin 'solar house'. He experimented with the relationship of glazed to solid areas, orientation of main living spaces and uses roof overhangs.
- The 'Garden Cities' in the early 20th century provided designers with good sensible rules and clearly laid out the benefits of good day-lighting.

Interesting questions & points of discussion from the audience:

There was a great deal of discussion about 'light', the beauty of daylight, how building users are always drawn to the 'sunny room' and the emotional drivers for passive solar. It was assumed that all were in agreement that there was nothing quite as wonderful as bathing in the rays of the sun, being aware of the central source of energy.....indeed there was a real danger that even the engineers might spout lyrical. Fortunately Max Fordham attempted to tighten the debate so that we could all have a point of reference for our arguments. There was clearly scepticism over the figures showing that solar architecture may actually be an energy guzzler and examples were presented from Central America, Spain, the Mediterranean..... No, Max was strict that we should be debating the future of 'passive solar architecture in the UK' and yes, of course we need light, but lets debate space heating.

It was pointed out that cities are collective efforts and that architects and engineers worked with the available space and tools and where possible, were very imaginative in the way that mechanical kit was used in supplementing natural energy sources. Flexibility was vital. There should be an emphasis on letting light into buildings without excessive heat. Good design at the solar interface was necessary.

Should photovoltaics and solar panels be considered as 'passive' or 'active' solar. Does movement of electrons constitute 'active'? -Possibly a topic for another debate.

Many had not realised that 'passive solar architecture' was being used as a design dogma. Yes, it appears that councils such as Brent were requiring that all new developments, in order to sport sustainability credentials (required for planning approval) had to design using passive solar concepts. General murmuring suggested that a dogmatic approach was foolish and once again, as with so many debates, we appeared to be in danger of complete agreement.

"Solar architecture is dead as dogma
Long live solar architecture where analysed as appropriate"

Luckily, Max put the amended motion to the vote and was excited to see that we had a thoroughly divided audience. Everybody was delighted to see Max's face light up- like a thousand suns!