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SUSTAINABLE ARCHITECTURE TODAY

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A supermarket converted to offices • Alternative Technology at 40

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Two for one deal

Even those familiar with the imperatives of the development cycle can be shocked by the butterfly lifespans of new buildings today. Replacement after 30 years is quite ordinary; 20 years not uncommon; some face the demolition ball when barely into their teens. Everybody knows that this is crazily wasteful, but the excuse is often that the existing building simply cannot be made to do what is required: the floorplate is the wrong size, or the services options too limited. In this context, it is good to see Bennetts Associates give new life to a former supermarket (p22), one of the least promising building types despite the flexibility of its steel frame, thanks to its deep plan. That such a space can accommodate daylit and naturally ventilated offices suggests that, given the will, reuse is almost always possible.

Above *Offices for The Moray Council by Bennetts Associates (ph: Douglas Gibb).*

Eco fact and fiction

Sofie Pelsmakers highlights essential design strategies and modern myths associated with sustainable building.

Design 'myths' regarding sustainability can cause not only confusion but sometimes serious mistakes within the construction industry, and the need to dispel them prompted me to compile The Environmental Design Pocketbook. The book is intended to provide building designers, clients, developers as well as students with a comprehensive sustainability resource as well as key recommendations, while also dispelling common misconceptions. Listed opposite are what I consider to be the five most important sustainable design strategies for creating fundamentally good buildings, as well as a list of common mistaken or inappropriate design practices.

Sofie Pelsmakers is an architect and teacher. Her book, The Environmental Design Pocketbook (£25, 416pp, RIBA Publishing) has recently been published.

Essential sustainable design strategies:

1 Passive, passive, passive!

It seems obvious, but all passive design measures need to be exploited before active design strategies are considered. Passive measures tend to last the lifespan of a building, usually outlasting any active systems. An exception may be MVHR, as once airtightness has been reduced to $3m^3/m^2hr$ (some argue $5m^3/m^2hr$) background ventilation must be actively controlled. It is important to ensure active systems are specified to the highest standard as they often underperform. This can be because most systems are laboratory tested, but also because most designers want to make pipework and duct inlets/outlets less obtrusive. Aesthetic decisions can result in long, awkward duct runs, decreasing efficiency.

2 Regional climate matters – one solution does not fit all

Large climatic differences in the UK's regions should be a key consideration in design, despite similarities between building regulations in England and Wales. The north of England and Wales are closer in climate to Scotland, and may need as much as 20-25 per cent more space heating than a dwelling in the south of England when built to the same minimum Part L standards.

3 Climate change is real

Buildings that will still exist in 2080 and beyond should incorporate flexible measures capable of responding to changing climate. Designing for an unpredictable future requires a common sense approach.

4 Keep it simple

Humans determine how buildings will perform. This not only refers to occupants' behaviour, but also to the building and systems designers' input. We tend to put our faith in complex systems and modelling to predict energy use, when in reality, systems and people will all perform differently. Most building models are just models, and should not be considered replacements for pragmatic design. Buildings need to remain resilient and functional, for example a model that relies on opening and closing windows to prevent summer overheating is misleading, as if the occupants are out of the house they cannot manipulate the windows and blinds. Keep it simple and realistic, in design and modelling assumptions, system specification and user behaviour.

5 Low- or zero-carbon does not equal sustainable design

While not mutually exclusive, they often conflict. Zero-carbon buildings often have to provide most of their energy through on-site measures. This can result in lower density schemes in order to increase the transportation of energy to and from buildings. Some airtight buildings neglect to use internal materials and finishes which do not off-gas. Increased airtightness can have a destructive impact on surrounding wildlife, which can nest in the gaps and cracks of leaky constructions. An awareness of facts such as these empowers designers to make low-carbon and sustainable design decisions.

Below *Perkins & Will's LEED Platinum office in Atlanta (photo: Eduard Hueber, Archphoto).*

Mistaken and inappropriate sustainable design practices:

1 Natural ventilation is not air conditioning

Naturally managed buildings are about achieving internal temperatures based on 'adaptive comfort'. This means that internal temperatures will vary according to external temperatures and conditions. While natural ventilation will temper the external environment within acceptable limits, it will never provide the unconditional low temperatures of air-conditioning. The perceived difference between inside and outside conditions can be more important than actual temperatures, and users' expectations should reflect this.

2 Warmer climates still require super-insulation

Despite climate change, it is still important to incorporate thermal insulation and increased airtightness to minimise winter heat losses and decrease summer heat gain. Even a Passivhaus will need some winter heat demand in 2080, regardless of the predicted warming, so super-insulation is still appropriate. Overheating occurs when heat gets trapped in a well-insulated building, so measures to prevent this will be crucial.

3 Thermal mass alone does not prevent overheating

In order to prevent overheating now, and in warmer periods, it is important to provide a combination of secure day-time natural ventilation and night-time cooling, together with solar shading and thermal mass. Failure to provide night-cooling will create great thermal discomfort and overheating once thermal mass capacity is saturated. Thermal mass is not effective unless exposed; covering thermal mass with plasterboard makes its thermal capacity ineffective. Typical outward-opening windows in the UK are not particularly compatible with summer ventilation and secure night-time cooling, so it is wise to specify inward opening, sliding or sash windows on east and west facades where vertical shutters are ideal.

4 Green roofs and walls may not be 'green'

While proprietary green roofs and wall systems may provide an immediate 'green' look, without extensive maintenance, energy and water, they often fail. For green walls, it is necessary to specify a system with species that grow from the ground up, even if this takes several years to develop. Once established they will not require energy or water to keep them alive, and future maintenance will be reduced. Large areas of thin green roofs, particularly when un-shaded in southern UK regions, are likely to require irrigation in dry periods. Deeper, more intensive or biodiverse brown roofs are more suitable in these conditions.

5 Grey water and rainwater harvesting systems can increase carbon emissions

Water efficiency should take priority over harvesting. Rainwater butts and small grey water systems are often overlooked in favour of more complex (and expensive) water collection devices which generate significant embodied energy. It is important to balance the effects of energy-intensive systems with simpler techniques, such as rainwater butts for manual landscape irrigation. A straightforward connection to mains water supply and sewers, ironically, is often a better strategy than a large-scale collection device.