WT - Green Infrastructure and Buildings

Buildings consume energy and resources and generate waste on a huge scale. Current construction methods tie us into future patterns of resource and energy use, waste emissions and environmental damage. When poorly designed our buildings leave a lasting legacy for the next generation that extends adverse social, economic and environmental impacts throughout their life cycle. There are many definitions of what makes a building sustainable with respect to social, economic and environmental issues; social in terms of adding to the quality of life for people, economic in terms of enhancing wealth, and environmental in terms of reducing the impact that buildings have on the natural environment. However the 'triple bottom line' of sustainability is open-ended and ecological aspirations vary widely, more recently focussing on aspects relating to transport, water conservation, and biodiversity. A current significant focus is being placed on the energy and environmental performance of buildings, with specific key goals involving the reduction of associated carbon emissions and energy costs. Identifying and developing more sustainable building materials and construction techniques that can minimize waste and are non-polluting is recognised as an important aspect of sustainable building design. Sustainable buildings must be resilient to climate change and be adaptable, flexible and durable in order to increase a building's life-span. This 'cradle to cradle' approach refers to a building that is designed to be deconstructed and where materials are capable of being recycled.

Design parameters for sustainable buildings have therefore increased to encompass more complex performance related criteria, and is vital that we architect adopt a more holistic perspective when designing. Our role as architect's is central to the building design process: the most energy efficient and environmentally friendly building must also be functional, durable and aesthetically pleasing. It is now vital that the architect has a comprehensive understanding of all the facets of sustainability in order to be able to engage with a wide range of disciplines and specialisms. The underlying hypothesis of the research is that a shift towards sustainable buildings requires a transformation of the architectural design process and the development of a new framework to navigate the complexities of sustainable design within a context that is promoting step change in building performance globally.

We need visions of a more sustainable future that can provide our current generation of designers and planners with sufficient motivation. At the same time we urgently need to improve the energy and environmental performance of the global built environment. An improved building design process aided by appropriate management tools and regulatory frameworks that address sustainable development issues has been suggested as a way forward, and is the subject of ongoing research (Grierson, 2009). The objectives of this part of the research are to investigate the design principles and processes for sustainability and to explore them in action within current practice. These components were used in the analysis of exemplar case studies from practices.

However, much is changing. We are seeing a push to create buildings and spaces that do not require external energy to heat, cool or power them. There are efforts to reduce the use of materials that have a high embodied energy and to increase the number of recycled/reused and recyclable/reusable materials.
This document is meant to be a WT survey of the wide array of options designers and builders have to create spaces that are more sustainable.

When looking at sustainability as it applies to architecture, there are several aspects of a building that are important to consider: atmosphere, longevity, energy, interface and equity.

The atmosphere of a building is the mood and feeling that it engenders. Is there sufficient lighting, how does one move from one room to the next and how is the air quality? A sustainable building will take into account all of these factors because the health of a building's users is intrinsically intertwined with the use of the building.

The longevity of a building also plays an important role in its sustainability. Spaces that remain of use to their occupants for a long duration are more sustainable than those that are torn down 35 years after they have been built.

Designing buildings that will last and be of use for generations should be a major goal of any architect. Reducing the energy impact of a built space is one of our most important considerations to be taken when constructing spaces. Building energy use comes in two forms: embodied energy and operating energy. Embodied energy, the energy required to create, transport and install the materials that make up a building, surprisingly make up a large portion of a building's energy costs (less if the building lasts longer). Operating energy is the energy a building uses everyday to heat and cool a space, run appliances and power any electronics within.