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## Valuing Sustainability

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Sustainability is the greatest challenge faced by our civilisation, in that, as other speakers in this distinguished series have said, and as Sir Nicholas Stern's report has recently demonstrated, its current trajectory cannot be indefinitely sustained, economically, environmentally or socially. The transition to a sustainable path is however beset by barriers, of which the most entrenched is the perception that long-term environmental sustainability, the most urgent issue, is not achievable without short-term economic loss and politically unacceptable lifestyle change. Whilst the triple-bottom-line concept of Sustainability implies that economic and social sustainability cannot exist without environmental sustainability, the reverse is also true. We cannot hope to achieve a sustainable environment unless we can afford it, through continuing economic success and increasing social equity across the planet. This suggests a concentration on seeking low-cost techniques to reduce emissions and on increasing our economic ability to fund less affordable methods.

I will limit my remarks to the subject of the built environment, my own field. It is however a large field. Humanity renders the planet useful to itself largely by creating built environment as modifier of the natural environment. The carbon dioxide emissions from the operation and construction of the built environment, excluding transport around it, are about half of all global emissions. Half of all humanity lives in cities, as of this year, and cities are growing at an amazing rate. My definition of the built environment is that it comprises the Property, Construction and Facility Management industries, linked by Design and Management activities, and that it is about 15- 20% of GDP and 77% of national fixed assets. We create, manage and trade this nexus within which all our activity takes place, without it impinging deeply on most people's



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consciousness that this economic and environmental elephant exists. Its qualities determine the effectiveness and efficiency of much of our activity, from office productivity to patient outcomes in hospital. It also sets the Quality of Life indicators for most people, defining their home territory and generating love or loathing for it. I want to explore with you ways of bringing the value of the built environment into the consciousness of decision-makers, and in such a way as to enable decisions on what to build to be sustainable economically as well as environmentally and socially; in the current Treasury parlance- Best Value.

Value is a slippery word. We use it in many contexts, implying tangible and intangible qualities. It is often used loosely as a synonym for cost whereas value is really the relationship between benefits received and costs incurred. Value is what you get over what you give to get it, in monetary and non-monetary terms. Good value implies a positive difference between what you get and what you give up to get it. But the yardstick of value is specific to the person making the judgement; value derives from the values of the judge. In a building project there are many stakeholder groups, each with a different agenda of benefits sought and of resources with which to get them. Stakeholders vary in their power to get what they need, but I contend that the most sustainable developments are those which provide positive value for all stakeholders. A commercially successful property redevelopment depends ultimately on the success of the occupier organisation as rent-payers and of the location developed as an attractive element of the city. The occupier's success flows from that of their staff and their customers, as enabled by their facilities. The local authority's success lies in providing their voters with economic opportunity, social inclusion and satisfactory environment.

All these stakeholders are seeking mixes of different and overlapping kinds of value, six kinds in the view of Sebastian MacMillan (ref). There is:

- Use value, the functionality and economy of the building in service of its occupier;
- Image or perceptual value, the communication of identity and status;
- Cultural value, the quality of the building as a work of art and bringer of a sense of place;



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- Social value, the contribution of the development to community needs and its accessibility to all;
- Environmental value, its impact for good and ill on the natural world;
- Asset value, the exchange value available in the market.

Edward de Bono published his own Six Value Medals in 2005, not aimed at built environment but very similar in thinking as a way of assessing tangibles and intangibles:

- Silver medal; the values of companies, embracing exchange and performance factors;
- Steel medal, quality values stemming from how well the item is designed and made;
- Gold medal; reflecting human values;
- Brass medal; perception or image values;
- Wood medal; for environmental values;
- Glass medal; for creativity

The best way to define what a building should try to do, to make the brief for the designers and builders, is to reveal the agendas of stakeholders for the project and then to negotiate a shared 'value proposition': a statement of what will bring the best overall value and of the resources worth investing. There is a promising technique in use today called the Design Quality Indicator (DQI) which provides a basis for stakeholder discussion of what qualities are sought and assists judgement of designs put forward as to whether they meet the targets. It uses a modern version of the Roman virtues of Functionality (Commoditas), Build Quality (Firmitas) and Impact (Venustas) as its framework, asking stakeholders to select the quality levels and weighting of about 100 factors which they consider will deliver the desired results, then judging proposals and finished buildings against them. I maintain that judgements of quality can be made more objectively than is usual if the 'value proposition' is established. Relevant qualities can be defined as those which deliver the desired value.



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How should one decide on the right amount to invest in a building to achieve best value? The typical pattern is to start with a budget based on the allocation of available resources, informed by the outturn capital cost of similar facilities with an overlay of thought about issues related to the site considered. There is hardly ever any consideration given to the operating cost budget or to the value of the building to the occupiers, other than in asset value terms where that is relevant. Yet a building costs typically three times as much to live with over 20 years as it does to design and build and it supports occupiers who will add 30 times as much value to the economy over those 20 years as the original capital cost. Surely the right amount to invest will be that which best supports the occupiers' success and minimises their cost of occupation, subject to getting good return on capital and to the uncertainties of the planned period of use? The right amount to spend to minimise climate change damage can similarly be judged by pricing carbon emissions into the equation and by considering how the building will adapt as weather conditions worsen.

Many campaigners against climate change treat the goal as one which is overwhelmingly valuable; a matter of life and death without the need for an affordability test. They face the Business As Usual (BAU) lobby that fears that the economy, and specifically their line of business, will suffer if they are made to invest uneconomically. George Bush's position is that America cannot afford to invest to avoid a long term future problem which no-one has proved to exist. The conventional tests of affordability simply don't deal with long term issues, or with externalities, issues which cost society but do not fall on the project budget. Sir Nicholas Stern called climate change "the greatest and widest ranging market failure ever seen" in his recent report to government. He makes the case for annual investment of about 1% of GDP for the next 40 years in reduction of CO2 emissions to a quarter of their present level per unit of GDP by 2050, to avoid a possible annual loss of 20% of GDP and severe societal problems. He is quite clear however that this investment must be made in the most economically affordable way possible, and that it may well turn out to be economically advantageous in the short term rather than a drag on the economy. He recommends regulation, to push investors to do the right thing. But he also wants investment in technology to provide us with cost-effective ways to meet the goal. Economics won't be separated from environmental



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sustainability. We have to make it economic or it can't happen. It's the developed world's equivalent of poor people deforesting mountain slopes to stay alive. They can't stop to save their long-term future as that would be suicide now. Jared Diamond's recent book, *Collapse*, follows the fate of several isolated societies in history which destroyed themselves by degrading their environment. They could not avoid their fate as they did not have the insight or resources to do so. We now have insight, unless we are George Bush, but Stern and others know we must proceed in an economically sustainable way if we are to become environmentally sustainable. The cost will be greater if we procrastinate, so the best investments will be the earliest.

However, we have great divergence of values out there in the community on how best to mend our ways. There are those who call for massive change in our lifestyle, eschewing air and car travel, air conditioning, industrial farming and world trade. Were it widely adopted, this would cause considerable damage to the world economy and so be unsustainable. What will prevent this are social sustainability factors: there is massive popular resistance in the developed and developing world to any curtailment of aspirations to the modern lifestyle. At the other attitude extreme are those waiting for the technical fix, the nuclear or hydrogen economy which would enable business as usual to continue. Their approach could delay the serious reduction of emissions and raise the stakes alarmingly.

The Contract and Converge model (ref) suggests a timeline for developed and developing economies to reduce emissions to a sustainable level in the mid-century. The developed world needs to reduce emissions now as it has the scope and resources to do so; the developing world is expected to increase emissions for a period, until it too can afford the methods we will have developed to scale them back. An economic opportunity for the West is to develop the technologies which will make low-carbon living affordable for themselves and then sell these technologies into the developing world as their affordability increases.

The UK Treasury is making significant moves towards linking economic and environmental sustainability, although it has yet to formally respond to Stern. It



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has established the policy that all public sector capital investment decisions shall be made on a best value basis. It has now elaborated that requirement in relation to public building investments, 52% of all those made in Britain by value. I am a member of Working Group 2 of the Public Sector Construction Clients Forum, chaired by David Adamson, lately director of this University's Estates Management and Building Services unit, developing a supplement to the Treasury's Green Book of rules for investment appraisal to make it more useful for whole-life building investment decisions. The National Audit Office and the Local Government Audit Commission use the Green Book to test whether public servants have done things the right way in the event of trouble. Avoidance of the auditor's wrath is one of the few things that does steer public servants' behaviour.

In the Green Book Supplement we call for budgets to be set on the basis of best value over at least ten years' operating life, with carbon dioxide emissions included in the costs at a starter sum of £70.00 a ton. With Treasury discount rate set at an historically low 3.5%, thanks to low inflation, operating costs will count significantly towards the budget. We hope that the Supplement will spur clients to optimise the value of their buildings to their users and reduce their whole-life costs. The approach improves overall economic performance and thus creates resources to apply to environmental investments with sub-optimal returns. David Adamson's experience at West Cambridge in having the William Gates building designed for very low operating costs was that it raised capital costs very little. Design costs may well be higher: it costs more to think unconventionally. However, the conventional ratio of design and management costs to capital cost is about 1:10, to life cycle operating cost about 1:30 and to occupier value added about 1:300. Better design should pay by improving on those ratios. As part of the Green Book Supplement, we also seek proper feedback from buildings in use, to provide guidance for future projects on what actually works and is worth the money.

There remains the problem of political affordability. If it is going to cost more capital to deliver better performing buildings with low life-cycle costs and carbon emissions then there won't be as many buildings funded initially. The savings on operating cost will, if properly accounted for, replace that funding in



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due course. But there could be fewer schools built for some years than under the lowest-capital-cost regime. Mechanisms like PFI help the government to afford higher-capex/ lower-opex projects: the unitary payment rolls them together. This could have happened already but has not, due to disincentives to integrate facility-management thinking into design.

There is also a problem in making many existing buildings sustainable. Whilst it may prove affordable to create low carbon new-build, it costs far more, if it's practical at all, to retrofit existing buildings to the same standards. Grants and loans are needed. These have appeared in the US as loans from utility companies who have found that it is cheaper to reduce demand by a kilowatt than to increase capacity by the same amount. The scale of the retrofit needed for low/zero carbon performance is substantial. Historic character can be lost in the attempt. The argument that existing buildings represent embodied energy and should be conserved falls down when refurbishment costs are too great and effectiveness limited. The new generation of buildings needs to be 'Long Life; Loose Fit; Low Energy' to revive a slogan coined by the late Alex Gordon, RIBA President in the 1970s when awareness of the energy issue really began. Generous, sturdy, building shells, shaped to be naturally lit and ventilated without overheating, will be able to last through change of use. Arup's marvellous plans for Dong Tan new city outside Shanghai envision a city without traffic noise or fumes, thanks to the exclusion of all but electric vehicles. Its buildings are thus able to stay comfortable with levels of power available from ambient and local sources. Dong Tan is however a gamble that we will succeed in avoiding major sea level rises: it is sited on the flat coast and would be among the first to succumb!

We are not likely in the UK to make zero carbon buildings pay for themselves purely by saving fuel costs or even carbon charges. We have to create surplus value by designing much more effective buildings for users, more functional and less costly to operate and change. This will expand the resources available overall and help to finance more marginally economic systems like solar electricity or fuel cells without dragging down economic performance. Commercial buildings will need to justify higher rents and public buildings will need to show better outcomes. All the new and various ways of assessing



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value and making good decisions will have to come into play. Much better building operation techniques will also be needed: many clever designs simply don't perform because they are left to ordinary mortals without instructions or training. Energy labelling will name and shame the poorly-run building, but we have to design our way out of reliance on scarce skills.

I have attempted in this lecture to show that environmental sustainability in the built environment will be delivered if we can make it affordable, not just because some want it. This means development in technical solutions for the world market but it also means development in ways of convincing ourselves. We can use the concept of whole-life value to achieve better performance in all its senses and to release resources for environmental solutions which might not otherwise be affordable. We have to use decision-making tools which overcome the market failure of conventional thinking with its disregard of the future and of externalities. We need to couple progressively tighter regulation with the availability of affordable technical solutions. We have to have answers to the problem of present building stock: we won't get to 2050 on target if we don't refit or replace all of it.

We won't be living in 2050 in the way we aspire to live now. There will have been trade-offs between what we want and what we can have. There will be amazing new possibilities as well as major shifts in what is fashionable. Both the eco-puritans and the baus (business as usual believers) will have scored some points. The lockstep principles of sustainability will, I believe, have been amply proved: that you must have economic and social sustainability if you are to have environmental sustainability.

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