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**Synopsis of Talk**

I am a little bit nervous of repetition here. I am going to be making some points that you may have already heard but I want to try and reinforce some of them, particularly ones that Helmut was making. I think it's important to consider what the real implications are of the global issues we have been talking about this morning. First of all there is the question of what actually is sustainable or green. I think the word sustainability is in danger of going the way of the word community, it can mean almost anything to anybody. Also it's pretty well easy for anybody to say something is sustainable today. I tend to call this "greenwash". It's easy to make a claim of sustainability because no-one is very clear what the definition actually is. There is also a fair amount of propaganda about how we all need to do our bit, or a little bit. I think that's not enough. We have to go a lot further than doing a little bit. There are people who argue that doing a little bit will make a significant difference, but because the subject of sustainable construction is complex, simply doing a little bit isn't enough.

I am going to say a little bit more about the waste of resources and to go into the alternatives that are available. So sustainability, I think, is becoming an overused word and it is in danger of becoming a marketing device rather than a genuine commitment. Just because you can come up with a product or a solution which helps to save some energy and is financially viable, it doesn't necessarily mean that it is going to save the planet. The reality of sustainability is that most of the buildings which we now produce with good levels of energy efficiency, achieve this using fossil fuel based insulation products. These are fire hazards, they give off toxic fumes, they can't biodegrade when they are landfilled and they tend to pollute the atmosphere during manufacture, and require a great deal of energy to produce them. We rely far too much on glues, sealants, membranes and so on which are synthetic, toxic, pollute the environment and often make disassembly very difficult. So, many of the materials which are used in construction are non-renewable, they leave holes in the ground behind, and they cannot be easily recycled. This is the reality, you just can't get away from this whatever we do. We specify conventional buildings at the moment and we are consuming resources. Even when we can include things like renewable energy and so on, we are talking about a very long pay back period and high environmental cost to achieve this.

We have already heard a bit from Helmut about the ecological footprint of the kind of things that we are doing today. There are different kinds of figures depending on the methodology. I have used perhaps slightly exaggerated figures here, but they have been put forward by people suggesting that we are in the developed western countries using ten times our fair share of resources and we will be needing somewhere between 6-10 planets to sustain our

current use of resources. The construction industry is a particularly big consumer of resources in terms of energy and one of the main contributors to carbon emissions. We waste a tremendous amount of material which goes onto building sites, and I am constantly amazed, even in this day and age. Construction waste is also one of the biggest contributors to landfill which in itself is an environmental problem. We also have a huge number of empty, disused or underused buildings which could meet many of our needs and yet we are under tremendous pressure to build new buildings. As we have heard there is a tremendous need for housing to meet the needs of people. So I think if you look at this from a global perspective the present practice is not sustainable, it's not acceptable.

One of the things that tends to happen in this discussion about sustainable development and green building and so on, is that we tend to talk largely about new build demonstration projects, but we are talking here about a very small percentage of the stock. The real problem, the real issue, is what to do with existing buildings and how to make them less damaging to the environment and there is surprisingly little work being done on that. I have tended to be focussed on looking at new build possibilities and suddenly realised that in fact this is not actually the major problem. It's what we do with our existing buildings that's the most important thing. Re-using existing buildings and therefore saving the embodied energy which is bound up within those buildings and reducing the amount of demolition waste and so on is incredibly important. So this is something that we really need to focus on much more in the future.

We also need to think a bit more clearly about the whole business of energy. I have been at a number of conferences and events where people have attacked me for focussing largely on materials and so on because they say that energy in use is the most important thing. We don't need to worry so much about how we do it, it doesn't matter if we use toxic and energy expensive materials, because if we save energy in use then that's the most important thing and figures are produced to justify that argument. But if you can actually produce a carbon neutral project, which as Bill Dunster has shown, can be quite achievable, then the actual nature of the materials and the resources bound up in production become much more significant. So in many sectors, particularly office and commercial and so on, buildings are being changed all the time so that over the life of that building the amount of resources and energy that goes into conversions and alterations becomes much more significant. It is terribly important, in my view, to consider the environmental impact of the materials and resources that are used. It is possible to reduce it in a number of ways. We also need to think very seriously about what happens to those materials when they come to the end of the line, so that they can be dismantled or reused. Even if they are stripped out after a short period of time, which very often happens in buildings, that they can be reused so that we are all the time looking at how to save resources.

One of the difficulties that we have is that there are now a growing number of demonstration projects which are very much seen as exemplars of the way forward. I find that many of these projects are what I call 'off-message'. In other words they are not necessarily giving people the right signals about the future. In a way it is a bit unfair to attack particular projects and I accept that there are worthy intentions. Nevertheless, we have been doing research by looking at about 200 projects which are promoted and claim to be sustainable, green, environmentally friendly, ecological or whatever. We try to work out what's gone into those projects and how far they actually come up to the claims which they are making. This is one particular example which is fairly close to home which is the Ecos Centre. Even though it is an incredibly important demonstration of renewable energy, there is virtually no use of

passive solar energy within the design of the building. A lot of concrete and heavy materials are used in the construction of the building and this is justified on the basis that thermal mass was required. But because there is no use of passive solar I find it hard to understand what the thermal mass is supposed to be doing! This is a building which is purely there to demonstrate the use of renewable energy, but they still only meet 75% - 80% of their energy needs from renewable energy. The building's not well located. You have got to drive to it. There's also no involvement from the local community in a local housing estate. I think these buildings are giving the wrong messages.

Another building that I am critical of is the Gaia Energy Centre at Delabole. It is one of the first wind farms in the UK. Here we have a building being made out of concrete blocks, aluminium roof and cedar cladding, and it is described as using sustainable materials. I don't understand how that kind of claim can be made. It has this very beautiful steel and glass water wheel. As there is no water driving it the water is pumped up and then spins the wheel around. I don't understand what that is demonstrating and there is virtually no use of renewable materials. When I challenged them about this they said they would like to have done all those things but we couldn't afford it.

We have got to get these things right if we are going to teach people what needs to be done in the future. We need to adopt an holistic approach in which we look at the upstream and the downstream impacts of everything that we do. There is no magic to this. You could come along and pay us a lot of money at the University to calculate lots of things like embodied energy, and do lots of lifecycle analyses and there's all sorts of stuff that can be done on that. But in a way the basic principles are very simple and if people were to follow those in a very practical and down to earth way you wouldn't necessarily need to do a lot of calculations. It's a question of thinking through the impacts of the decisions that you are making.

Beyond carbon neutral buildings we have to look at zero impact, because if we are consuming more resources than we can sustain over the next decades then we have to look at different ways of doing things. The figures that Helmut showed demonstrated this very clearly. Now, it's not necessarily going to be that easy to achieve zero impact buildings. But at least if we set that as a benchmark, as a target, something we are trying to work towards, then we can have some kind of basis on which to judge how far we are able to achieve that aim.

All buildings inevitably are going to use some resources. Do we have to use as much as we normally do and are there other alternatives? Many of the assessment systems currently available to us to evaluate projects - SAP was mentioned just a few minutes ago - are essentially based on existing practice. They are trying to push things a little bit further along, but are not based on a fundamental critique of the way we do things now.

So what sort of things do we need to move towards zero impact building? We can use renewable materials. Renewable means renewable! In other words that those materials can be replaced within a realistic timescale. The big issue here is about timber. For instance, the Gaia Energy Centre say that they use sustainable timber, but what does that mean? If you cut a tree down, it's going to take 60/70 years for another tree to grow. You can't get away from that, you can't just get trees to suddenly pop up. If we carry on chopping down the forest at the rate that we do, we are going to have serious problems because we are going to have to wait 60/70 years to replace them, even if their supposedly being managed in an environmentally friendly way. At least with the Forest Stewardship Council (FSC) we have

got some kind of benchmark of good practice but those sort of methods are not available for other materials.

Materials have got to be responsibly sourced. It doesn't mean getting it from the other side of the World! I was talking to people at the trade exhibition at the RDS in Dublin who are selling granite products, and they are doing extremely well. There is a big upsurge in interest in granite particularly from the public sector replacing kerb stones and the nice urban upgrading schemes. The granite is coming from China. Now using recycled materials is an obvious thing to do but we have to be careful about that because that can then feed the demolition of existing buildings in order to generate high quality architectural salvage when those buildings perhaps themselves ought to be retained and used. So we have to be very careful. We obviously have to try and create a carbon neutral building, reducing energy as much as possible, so we have to introduce some kinds of controls. These things have got to be thought through and talked about and they are not being talked about rigorously enough at the moment.

There are a range of possible materials which can be used which I would characterise as low impact materials, not necessarily zero impact materials. For instance earth. We can use clay and mud forms of construction. This can replace a lot of the materials which we currently use from quarried and highly processed production processes. But earth is not a renewable material, once you have dug it up out of the ground it isn't going to reinvent itself. It is going to go into your building. Potentially in small scale developments you can maybe use the earth that's underneath the building, you need to dig it up anyway. So earth is only a low impact material, it is not a zero impact material. On the other hand it has a tremendous potential as a building material and should be considered at all possible times when you are looking for an alternative.

Then there are an awful lot of materials that are made from waste materials such as fly ash. Glass is a potential material which, if recycled, can be used for building products. The levels of technological development in this area is varied. It is possible now to replace cement. There is a lot of work going on around the World using rice husk ash for instance to replace cement and produce very good quality materials. So there are potentially renewable resources. There are waste products, but sometimes these are relying on power stations and other things that in a sense we should be trying to phase out anyway.

Then there is quite a lot of very interesting work going on using bio-composites and eco-composites. One of the crazy things that tends to happen these days is that there is a huge gap between the scientific community and the construction industry. There is a great deal of innovation and people are working on remarkably interesting new materials, but nobody from the construction industry is ever at the conferences. There's no interface, there's no technology transfer between the innovation which is going on and the possible uses of these materials. So there's lots of patents building up in filing cabinets, but nobody's making any use of them.

Recycled materials, I have mentioned, cannot really be seen as a zero impact material. We've been doing research to look at materials that are genuinely renewable. Particularly we have been doing research into the use of hemp as a building material. We have been looking at straw bale building. It's still regarded as a bit of a joke in the UK but straw bale building has become so mainstream in the USA. I was invited to somebody's house in California

which turned out to be a straw bale house! They hadn't even thought to mention it because it wasn't seen as anything particularly unusual.

Timber again is a renewable material, but we do have to be conscious of our responsibilities in this respect and obviously we can use recycled material as we saw in Bill Dunster's presentation. But a lot of timber is being imported from the other side of the World and there are quite major attempts to undermine for instance the Forest Stewardship Council certification methods. People are challenging these things in order to allow more unsustainable timber onto the market.

Products like wool, you know the farmers had tremendous problems with what to do with all their sheep. Wool could be used as an insulation material and there are a number of companies developing that now.

Bamboo is perhaps the most renewable material that you could possibly. It can grow so quickly that you can actually watch it growing! So if you cut down bamboo plantations it can regenerate itself within 2 to 3 years. There's some remarkably interesting exciting buildings and building products using bamboo. Bamboo can be grown in temperate climates as well; it doesn't just have to be seen as a tropical material.

We are currently working on a project called The Grow Build Project and the idea is to see whether it is possible to grow your building. This is not meant to be seen as some kind of peripheral project, but it's to be something that could be part of mainstream construction. There is no reason why the kind of experiments we have been doing couldn't be duplicated on a much larger basis, and we have been very excited about the possibilities.

We are using composite mixes of hemp and lime, and also hemp and earth. There is a conventional form of hemp construction in France which used quite high amounts of hydraulic lime. We are trying to replace this with earth and ending up with something similar to the old-fashioned cob building. We are trying to develop it in a way that can be very sophisticated, delivered to site in a way that can be quickly and easily used. It is providing a material that has very, very low impact indeed, and it has all sorts of other environmental qualities. Apart from that it also provides an alternative crop for the rural economy and its adding a great deal of value to something that otherwise is currently just being sold as horse bedding.

Up to now most of the work that has been done on this hemp project has been funded out of my own pocket with a little bit of help from the University and a tiny grant from the Millennium Commission. It is surprisingly difficult to get funding to develop these sorts of innovative approaches.

One of the important things which always worth looking at if you suspect there's some "greenwash" going on, or if people are fudging their commitment to sustainability, is to look at the issue of indoor air quality and the health impacts of buildings on people. This is an issue which is very, very frequently ignored, particularly in the UK. It seems to have a much higher profile in the United States and Germany and Holland. But here somehow we seem to have put up with all sorts of vile pollutants into our buildings and breathe them in happily without being concerned about it. I am completely at a loss to understand why that is the case, but it does get overlooked time and time again. We have looked through a couple of hundred examples now, so called green and sustainable demonstration projects in the UK and

hardly any of them concern themselves with indoor air quality and with the health impacts of the materials. There are toxic materials used within those buildings. It just isn't on the agenda here. Attitudes are changing. We did a programme on Radio 4's Costing the Earth about this. There was a huge response from the general public who are interested and concerned, but simply can't get the information about it.

We are also working on a research project funded by the EPSRC into the opportunities and obstacles for green materials and products. I like to use the term green because I think it's a bit less equivocal than sustainable. We are working here with relatively small companies. At least one of them is represented here today in the shape of Natural Building Technologies who are trying, and having some success now, of getting green and sustainable products and materials into the mainstream, onto the shelves of builders merchants and taken up by fairly major projects. But it is quite an uphill struggle for these companies and they are constantly having to fight. It's a very much David and Goliath fight.

One of the other companies, Eco Solutions, produces an environmentally friendly paint stripper, has constantly to fight against propaganda from the big multi national companies that claim that they've got products that do the same thing. It's not easy, and the amount of support that comes from Government for this is extremely limited. We are beginning to document cases that we come across where people claim to be using sustainable materials but when it comes to it on the site, these products are substituted by conventional materials.

There's always the big excuse about how it's going to cost more. But it doesn't have to cost more if these things are designed and specified in right from the start and the thing is thought through properly. There is absolutely no reason why there should be extra cost. OK some materials do on the face of it appear to cost more. But those costs are going to come down as there is a much bigger take up.

If local authorities, for instance, were to really seriously implement green purchasing policies, particularly in the construction sector, even just local authorities represented in this room, that would create a much, much bigger market for the kinds of environmental products which are now becoming available. If they were taken up on a large scale then you would find the cost would come down significantly. In theory, many renewable products would cost much less than the expensive fossil fuel based synthetic quarry products.

There are obviously problems of a lack of availability and ways to get hold of these things. Very often there is ignorance, people don't know they're available. Then there is virtually no Government support at all, there are no programmes targeted on supporting development of sustainable construction. Even the EPSRC programme that we are funded under currently appears to have disappeared because of a lack of bids from the University sector for research into sustainable construction.

I am trying to challenge you to think that it's not easy. We have to make radical change in the way we build our buildings and what we use to make them if we are really going to start to reduce resource use and materials.