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What lies ahead

Part two of Craig Pocock's sustainable futures

Craig Pocock explains how the New Zealand landscape industry can move towards a more sustainable future. Part one featured in Landscape New Zealand, February 2007.

THE CARBON LANDSCAPE

As a profession we are responsible for creating huge volumes of carbon dioxide. It could be argued that through planting we also trap carbon, with which we should be credited. The question is: Does our carbon consumption offset our carbon creation? And do we specify enough green space to offset the carbon costs of our landscapes? Issues such as water and resources, rapid consumption of ecologically important land, the loss of biodiversity, and sense of place are all critical issues facing New Zealand. However, I believe that one of the most important is the carbon footprint of our profession and industry, because the direct release of carbon in creating our landscapes has a very real and fast flow on effect into the many environmental issues that I just listed. Carbon is one of the most important elements of sustainable landscape design. The net production of carbon in the landscapes we design comes from many sources, from material production and transportation to implementation and the management of projects.

The issue of selecting carbon conscious material in our designs seems to be a little confusing at times. There is no easy way to avoid all of the high carbon cost materials in a landscape, especially concrete, and steel and other metals. It is not an issue of setting absolutes, such as saying that there can be no concrete or stainless steel used. It is an issue of understanding the cost of the materials selected and using them

in an intelligent and sparing way. For example the benefit of the thermal mass and/or high resiliency of a concrete surface may offset the cost of the carbon released, so the approach would be to use concrete in the areas that best suit its inherent material qualities, and not to over specify it elsewhere in the design.

If copper is to be specified in a landscape detail it should be done with the understanding of the high carbon footprint the product has, as well as the high pollution and community health issues associated with producing copper. At that point a designer should question if copper is the only material that will do the job.

Specifying "Forest Stewardship Council" certification of timber would seem like a safe sustainable option, which of course it is - if timber is locality produced. But under the requirements of sustainability the cost of the timber's transportation becomes important (CO₂ produced moving it and fossil fuels consumed). It is the simple think global act local, for instance, if eco-friendly timber comes from Indonesia, then the high carbon transportation costs outweighs gains.

Transportation is not the only issue. Often the manufacture process of a material is where the highest amount of carbon is hidden. The carbon cost of in situ concrete is in the "Portland cement component" of concrete. The process of making Portland cement has high carbon cost due to the consumption of energy to create the massive heat required to turn the raw products into Portland cement.

The carbon transportation cost is important with concrete pavers; the embodied energy cost of pavers can be double that of in situ concrete.

It is possible to work out the carbon cost of a project. As landscape architects we should be working

out this cost, and offsetting it as much as possible within the design, implementation and management of a project. This may require buying carbon credits for example, to offset an urban project that does not have enough space for planting to offset the carbon footprint.

To work out the carbon cost of a landscape we need to understand the carbon cost cycle of landscape design with the aim to minimize carbon at each stage.

Each carbon stage of design has differing degrees of importance. With good management a landscape firm might, for example, save 300 tons of carbon per year with good office transportation and energy policies. But a single design decision, poor material choice or poor landscape management or maintenance policy could cost 1000 to 10,000 tons of carbon to a project, effectively nullifying any carbon savings from the office. A complete understanding of the carbon landscape is needed.

Below is a description of some carbon characteristics in landscape starting from the least important.

Carbon neutral design firms

Each design firm has a carbon footprint which can be managed to be minimal, or even neutral (zero carbon cost). A local carbon conscious firm working on a local design would cost that landscape design little in carbon points. By contrast a New York firm flying around the world to work on the same design would create a higher carbon footprint for the same project, that would need to be added to the total carbon cost of the job.

Design and material selection

How a space is designed and the amount and types of materials specified designer comes with a



carbon cost of materials, which is measured in subcategories depending on issues such as how the raw product is harvested and how far it travels to the final location. For example, it is hard to justify the use in New Zealand of sustainably grown hardwood from far off Asian countries, and call it sustainable.

Landscape implementation

The ways in which a landscape project is implemented by contractors has a carbon cost, as well as other costs such as the waste generated by the project. Negative impacts on the environment can't be mitigated.



As an industry, landscapers need to consider becoming completely carbon neutral in their practices from design through to completion, including the use of sustainable raw materials, says Craig Pocock.

Management of landscape

Landscapes are dynamic living places that require resources, maintenance and often large amounts of water and fossil fuels to keep them in the desired condition. If a landscape is managed over decades then it is possible for the carbon and resource costs of maintaining that landscape to easily outweigh any of the resource and carbon savings gained in the design and implementation stages. The total environmental cost of a landscape has to be understood from design through to management. And all such opportunities need to be utilized to minimize those costs.

Carbon future

As an industry we need to research new materials, manufacturing techniques, and construction practices to come up with a palette of options that have the lowest possible embodied energy factors, waste production and environmental impact. We also need to consider how we might reuse and recycle materials.

We need to develop the skills to calculate the carbon cost of landscape design and management plans.

Landscape members and the landscape Institute should also consider becoming completely carbon neutral in their practices.

Issues about the carbon cost of a project are a key component of stages two and three of the Sustainable Design Award Categories, and are covered in further detail below.

Sustainability awards further details This section gives details for the three stages of the sustainable design award categories listed in part one of this feature, which ran in Landscape New Zealand, February 2007.

STAGE ONE

The vision

"Does the project have any future vision, does it help New Zealand landscapers in general move forward

in environmental design or is it just practicing what we already know?"

The following questions are some of the most important for the industry to consider today. Does the project incorporate new ideas and ways of thinking about sustainability or is it simply repackaging best stormwater practices and recycled materials?

Does the project take existing ideas of sustainability and seamlessly integrate them into the project's creative responses and/or spatial design, or are items like the stormwater management still on the periphery and seen as a green engineering solution.



STAGE TWO

General sustainability principles

These are sustainable principles that would be considered base line requirements for sustainable work.

Embodied energy

Goal

To create the lowest possible carbon value for the implementation of the project. This should be considered in the following:

Material selection

Was there an attempt to minimize the embodied energy cost of the project in the materials chosen? If paving, walls, or handrails were required, did they specify the lower embodied energy options, or stick with the traditional approach in choice? Was there appropriate design of the size of hardscape areas to minimize material consumption, especially in the hard paving surfaces? Were the bulk of the materials specified locally sourced? Was there any reuse of materials from the site afterwards? Was there any use of recycled materials from outside the site or not? Do the materials selected have a low toxicity? Another important question is: were durable materials selected to reduce future material consumption through replacement? Were any locally sourced sustainable materials used? (Sustainable materials from other countries do not count here, due to the high embodied energy of their transportation.)

Stormwater system

Is any of the stormwater harvested from roads, hard surfaces and roofs and reused within the buildings or landscape? Also, does the project incorporate best stormwater management practices, including permeable surfaces, swales, rainwater gardens, and greenroofs?

Planting

Were Xeriscape/zero irrigation principles used within the landscape planting? Does the planting require an irrigation system, or have the plants been selected to minimize water consumption, or has the stormwater system been designed to maximize the access to water for plants? Were the plants sourced locally, reducing embodied energy?

STAGE THREE

In-depth issues of sustainability

These are principles that show a greater level of dedication from the designer to achieve sustainability within the design and the management.

Planting

Has the planting been chosen to minimize or remove the use of chemical maintenance? Has the planting and lawn area been minimized or a maintenance schedule specified to reduce mowing and maintenance, hence reducing CO2 emissions and fossil fuels consumption

from the use of mowers and other machinery? Was the existing soil amended to form a good growth medium, or topsoil brought in at the cost of another environment?

Construction

Were sustainable specifications created to reduce the impact of the project on the site, such as recycling of construction waste, reduction of water consumption, protection of the environment from soils to air and the minimum use of machinery? Were the sustainable intentions within the design actually built or did they get lost during the value engineering or construction stages of the project? Was a local contractor used to reduce the embodied energy and fuel consumption of commuting?

Landscape integration into architectural or urban design

Does the landscape design support building systems such as, but not limited to, heating, cooling, wastewater, rainwater harvesting?

Community

Are the issues and processes of environment, stormwater and resource consumption, interpreted within the

design or made transparent (actively or passively) to the community in such a way that may create positive change in public awareness of the greater environment involved? Was there community involvement in the project? Was the process that created community spaces transparent to ensure longevity and community buy-in, or is it foreseeable that the project could lose favour over a short period of time and be reinvented at the cost of the materials used in the project.

References

These types of questions in the Sustainability Design Awards Categories document are a starting point for a designer working towards a sustainable outcome. These questions make up the base for important publications such as "Sustainable landscape construction-a guide to green building outdoors" and "The Ecology of Building Materials" which are worth referring to if you require information about these issues. ☞

For more information about the issues in this story, contact Pocock Design Environment Limited. www.carbonlandscape.co.nz

BELOW: Looking after the environment involves considering everything from the pavers (below left); where they were sourced and how they are laid through to the use of plants. A manicured look is not always the most sustainable and allowing plants to grow as they would in the wild creates food for thought.

