

Green Building Assessment Tool Research Project

Final Report

Prepared for the Ministry for the Environment
by the New Zealand Green Building Council

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Executive Summary

The Green Building Assessment Tool Research Project (February – June 2006), was undertaken by the New Zealand Green Building Council (NZGBC) in collaboration with URS New Zealand Ltd (URS) for the Ministry for the Environment. The goal of the project was to present a solution for the development of a sustainable building rating system for new office buildings in New Zealand.

The process undertaken involved background research into existing rating systems, industry consultation, and discussions with tool designers. All decisions recommended were put forward by an expert project advisory group (Table 1-1).

Govt³ plays an important leadership role in setting standards of best practise for buildings tenanted and owned by government departments. An industry driven sustainable building rating system for new office buildings will ensure that benchmarks, weightings, measurement techniques and process to achieve best practise are understood by the entire building delivery chain. Green building councils around the world have successfully partnered with government to design, own and manage high quality innovative rating systems that have made significant market impacts with the uptake of sustainable building practices.

The result of this project is the recommendation for New Zealand to adapt the Green Star scheme, developed by the Green Building Council of Australia (GBCA), supplemented by the technical weightings, measuring criteria and performance innovations of the Green Office tool, which has been developed in New Zealand by BRANZ Ltd. The proposed system for New Zealand will use the Green Star categories and framework and aims to connect the stages of the building life-cycle in a more simple three staged approach; *design, construction and performance*. The role of the NZGBC will be to educate the market to use the different tools at each stage of development to achieve the final and full certification two years after construction is complete when actual performance has been measured.

A draft version of the Green Star adaptation for New Office Design and Construction (As Built) for New Zealand is targeted to be available for public comment and use in December 2006.

Having this system will set the standard for best practice in New Zealand and will assist in acceleration of green building practices throughout the building and construction industry. This will result in minimisation of waste to landfill; a reduction in energy demand and use; a reduction in water demand and use; and healthier more productive work environments which in turn will positively affect occupants' physical health and wellbeing.

1 Introduction

1.1 New Zealand Green Building Council

The New Zealand Green Building Council (NZGBC) is a broad-based coalition of property and building industry representatives working with government to ‘transform the built environment towards sustainability by reducing the impact of development and use’. To do this, the NZGBC has engaged, and will continue to engage, all sectors of the property and construction industry from owners and developers through to tenants and end users.

The objective of the NZGBC is to promote the mainstream adoption of sustainable building principles, policies, practices, standards and rating tools. The NZGBC seeks to improve the overall environmental performance of building by: reducing environmental impacts caused during construction; reducing resource consumption (eg, energy, water); and significantly improving the quality of indoor environments in existing and future building stock. The outcome of these efforts will be a more sustainable future with buildings that are environmentally and economically efficient, as well as healthy environments in which to work, live and play.

To facilitate the transition towards a sustainable built environment, the NZGBC has acknowledged two key points of focus:

- the vast and international wealth of knowledge and experience with ‘green buildings’ and ‘green building assessment tools’
- the needs, current practices, and demands of the New Zealand market-place.

The NZGBC believes that a building rating and assessment tool is a fundamental market driver for this transition to occur. In this regard, the NZGBC has the unique opportunity to draw on the successes and challenges of international experience to produce a New Zealand specific assessment tool. On behalf of the Ministry for the Environment (MfE), the NZGBC proposed to review a number of international and domestic rating tools and assess their suitability for effective adaptation and implementation in the New Zealand environment.

Specifically, the NZGBC has researched the feasibility of the following rating schemes: LEED (US), BREEAM (UK), GBTool (Canada), CASBEE (Japan), BASIX, Green Star and NABERS (Aus), Green Office and Green Home schemes (NZ). While there are many similarities between these schemes, the various methods of assessment and scoring all differ to some degree. The differences generally reflect variations in the market to which they cater, the stage of the building process to which they apply, the environmental issues they address, and the purpose for which they have been designed (Hargreaves, 2005).

While researching international rating schemes, the NZGBC has taken clear measures to keep the market informed of the tool establishment process as well as engage their local expertise. To date, the NZGBC has uncovered a strong demand for a New Zealand specific rating tool which is closely interchangeable with related international assessment tools. In addition, the market demonstrated a clear preference towards an accessible interface with Australia’s Green Star system due to proximity of markets. The result of this work is the suggestion of a framework that includes all the demands from the New Zealand market-place.

1.2 The Project

1.2.1 Project Design

Over the past six months, the NZGBC has worked diligently to initiate and pursue a strong and mutually beneficial relationship between the NZGBC and the property and construction industry. This project has enabled the NZGBC to have a specific focus for this engagement. It is this relationship that will in the end ensure the success of any commercialised system. To build this relationship, the NZGBC has taken a two pronged approach:

- public meetings to promote industry knowledge and stimulate generalised thought, awareness and feedback
- a Project Working Group (PWG) to facilitate industry-based decision-making.

The purpose of these public meetings was to ‘meet and greet’ the industry—to inform them of the background, goals and status of the NZGBC establishment, and investigate a solution for a new commercial design tool for New Zealand. In addition, these meetings provided a forum to gather a wide range of feedback and stimulate industry wide interest through involvement and increased understanding.

At the same time, Project Working Group (PWG) meetings involved a smaller group made up of people from different industry perspectives and interests. The ultimate goal of the PWG meetings was to come to an informed agreement between the NZGBC and industry on a solution for New Zealand. It was understood that during the course of the project consideration would also be given to tools related to the assessment of both new and existing buildings and retrofits but with a primary focus on a solution for a new commercial design tool.

Project Working Group meetings were structured to achieve the following progression:

- examine existing tools based on research provided by URS NZ Ltd
- identify a green building rating tool or suit of tools appropriate for New Zealand buildings
- develop an associated plan for adaptation and implementation.

The results of the PWG were very positive. Members of the PWG spoke publicly of their involvement and desire for an effective building assessment tool at the most recent public meetings (June 2006). In addition, the NZGBC presented the generalised structure for a New Zealand specific rating tool and received positive feedback. Looking forward, it is suggested that a future project be designed to properly adapt and implement a tool for use in New Zealand.

1.2.2 Project Working Group Members

Table 1-1 Project Working Group Members

Jane Henley	NZGBC	NZGBC Establishment CEO
Michael Field	URS New Zealand Ltd	Technical Project Manager
Wayne Sharman	Building Research	Working Group Member
Marko den Breems	Jasmax	Working Group Member
Chris Wood	Ministry for the Environment	Working Group Member
Geoff Banks	(ACENZ) Structex	Working Group Member
Justin Lees	Connell Mott	Working Group Member
David Kernohan	DBH	Working Group Member
Jason Happy	Kiwi Income Property Trust	Working Group Member
Hans Buwalda	Fletcher Building	Working Group Member
Chris Mason	NZIA	Working Group Member
Mark Sigglekow	Pragmatix	Working Group Member

1.3 Report Objectives

This report provides a summary of the work completed during this project. It includes:

- a) An outline of the project methodology applied (Section 2).
- b) Background research for existing green building rating tools (Sections 3 & 4).
- c) Public consultation outcomes – resulting from workshops and meetings held (Section 5).
- d) Review of the industry requirements of a sustainability rating scheme and the issues identified (Section 6).
- e) A detailed description of the decision-making criteria and selection process undertaken to reach the final decision (Section 6).
- f) Final recommendations for the adoption of the Green Star and Green Office tools in New Zealand (Section 7).

1.4 Acknowledgements

The authors would like to take this opportunity to thank all those who have been involved in the process to date, including the industry representatives that attended the seven workshops (two in Auckland, two in Wellington, two in Christchurch and one in Dunedin) and offered feedback and discussion that has helped us understand industry needs. Thank you to all of the international tool designers who have provided information on their existing tools through the matrix sent to them, and other supporting material. In particular we acknowledge the industry representatives who provided their time and expertise to the Project Working Group.

Thank you to URS New Zealand Ltd, and especially Michael Field, who has carried out all of the research throughout the project and compiled the material for this report.

Thank you to Jasmax and Dr Paul Jursovich for their review for the project, ideas and support over the past five months.

Thank you to Alec Williams, who has helped behind the scenes writing, questioning and ensuring that we listened and then had a clear process for complex multi-stakeholder engagement.

Special thanks go to BRANZ for the use of their own assessment tools research report, which greatly aided the research segment of this project, written by Rachel Hargreaves (Hargreaves, R (2005) *Compendium and Evaluation of Building Environmental Impact Schemes being used in Australasia*. BRANZ SR 135. Judgeford, Wellington). And for the presentations at all of the series two workshops.

Final acknowledgement goes to the hard work and dedication of the Establishment Board of the NZGBC who have laid the foundations for the organisation so this project was possible, as they continue to steer the organisation into a strong position for full operation in July 2006.

2 Methodology

2.1 Background Research

This project was custom designed to promote interaction and learning from our international and local peers. This ensured that we did not re-invent the wheel; but built on existing knowledge. Through the World Green Building Council, a culture of sharing and learning on a global scale has been established.

The following process was designed to compare and contrast a number of tools that measure the sustainability of a building, both from New Zealand and overseas.

Section 3 and 4 summarise the features and benefits of each of the various schemes and assesses each in terms of what it measures, its purpose, the people who use it, and other deciding factors. The tools examined were:

- Green Globe 21 (Australia)
- Green Office Scheme (New Zealand)
- Green Star (Australia)
- LCA design: Life-cycle Analysis (Australia)
- NABERS: National Australian Built Environment Rating System (Australia)
- TUSC: Tools for Urban Sustainability Code of Practice (New Zealand))
- BREEAM: Building Research Establishment Environmental Assessment Method (United Kingdom)
- LEED: Leadership in Energy and Environmental Design (United States)
- LEED Canada
- GBTool (Canada)
- CASBEE: Comprehensive Assessment System for Building Environmental Efficiency (Japan).

2.2 Request from Tool Designers

A matrix was designed so all 14 tools of interest could be compared and contrasted against each other. There were some challenges in doing this, as different tools measure criteria in varying ways. Therefore, some general grouping transpired and some topic headings generalised. This matrix was in spreadsheet form and listed the issues covered by each tool, with a separate worksheet for each topic section, such as Management, Indoor Environment Quality etc. To ensure our process was transparent and up-to-date, the matrix was then sent to all of the relevant tool designers and they were asked to enter the appropriate data.

In cases where no response was received, these were entered by URS based on the information within the respective tools technical manuals.

2.3 Industry Consultation

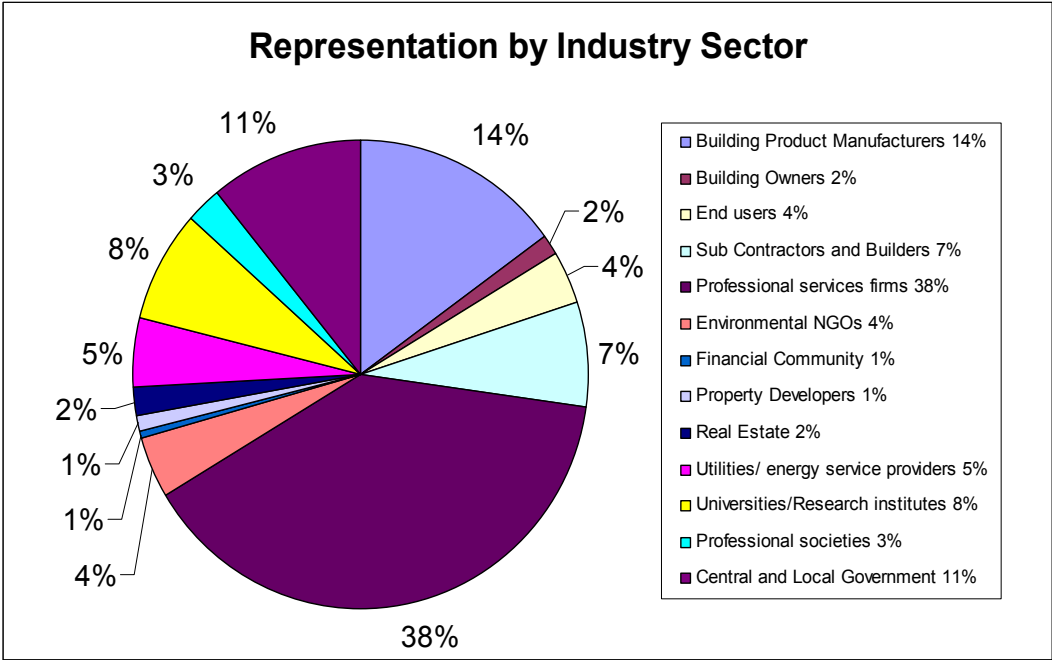
Series 1: Workshops

There were two series of industry consultations as part of the Project. The first series was held in Auckland 4 April; Wellington 5 April; and Christchurch 6 April. Approximately 200 people attended the NZGBC workshops (see Figure 2-1 for attendee breakdown). The first set of workshops were four hours and began with a brief presentation about the NZGBC and the background to the project and rating tools in general. Lengthy group discussions based around each of the key themes addressed by existing tools followed. Groups were asked to record their comments and to rate a number of issues relating to each of these themes in order of importance. The feedback provided and discussions generated were particularly valuable in assessing what interested parties believe a New Zealand green building rating tool should measure, and helped to identify gaps in existing tools that could be addressed.

Number of Registrations:

- Auckland: 125**
- Christchurch: 50**
- Wellington: 65**
- Total: 240**

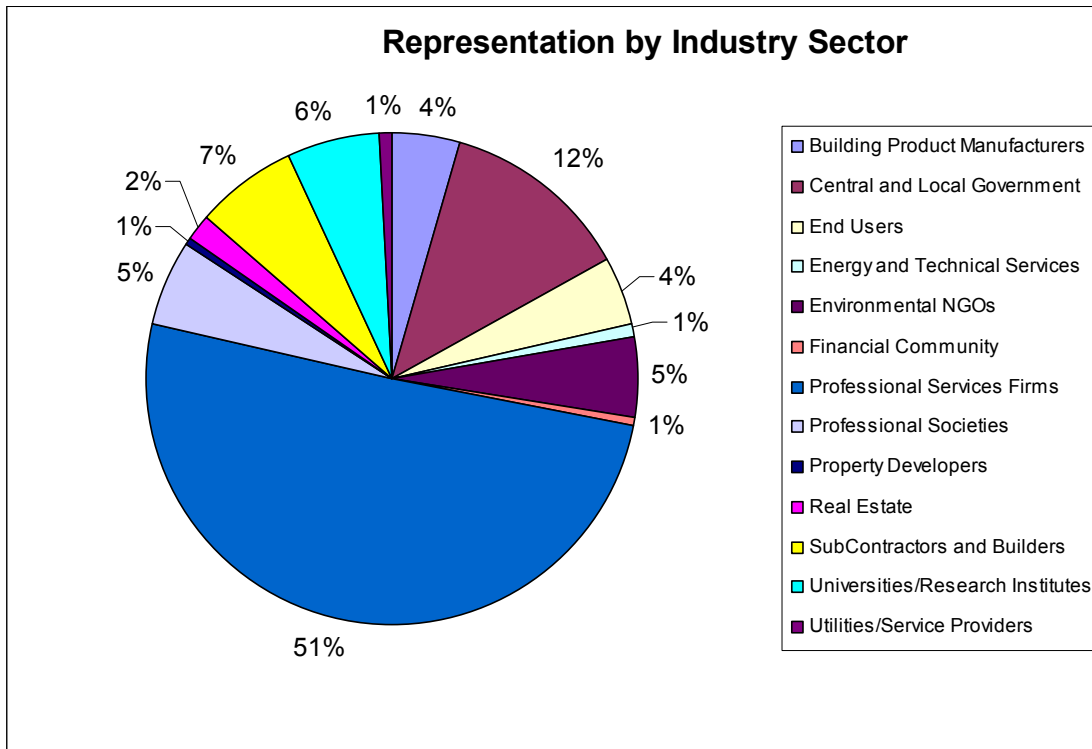
Figure 2-1 Workshop Attendance (Series 1): Representation by Industry Sector



Series 2: Presentation and Discussion Panel

The second series was held in Auckland 20 June; Wellington 21 June; Dunedin 22 June; and Christchurch 23 June. These were after work 1.5 hour sessions. Approximately 300 people attended the second series of presentations (see Figure 2-2 for attendee breakdown).

Figure 2-2 Workshop Attendance (Series 2): Representation by Industry Sector



The presentations began with a big picture overview about the NZGBC and the project process (presented by Jane Henley, Establishment CEO). Rachel Hargreaves, BRANZ Ltd, then presented the technical side of the project recommendations. There was then a discussion with the panel in each city which was made up of the local representatives of the Project Working Group.

Number of Registrations:

Auckland: 149

Wellington: 114

Dunedin: 17

Christchurch: 48

Total: 328

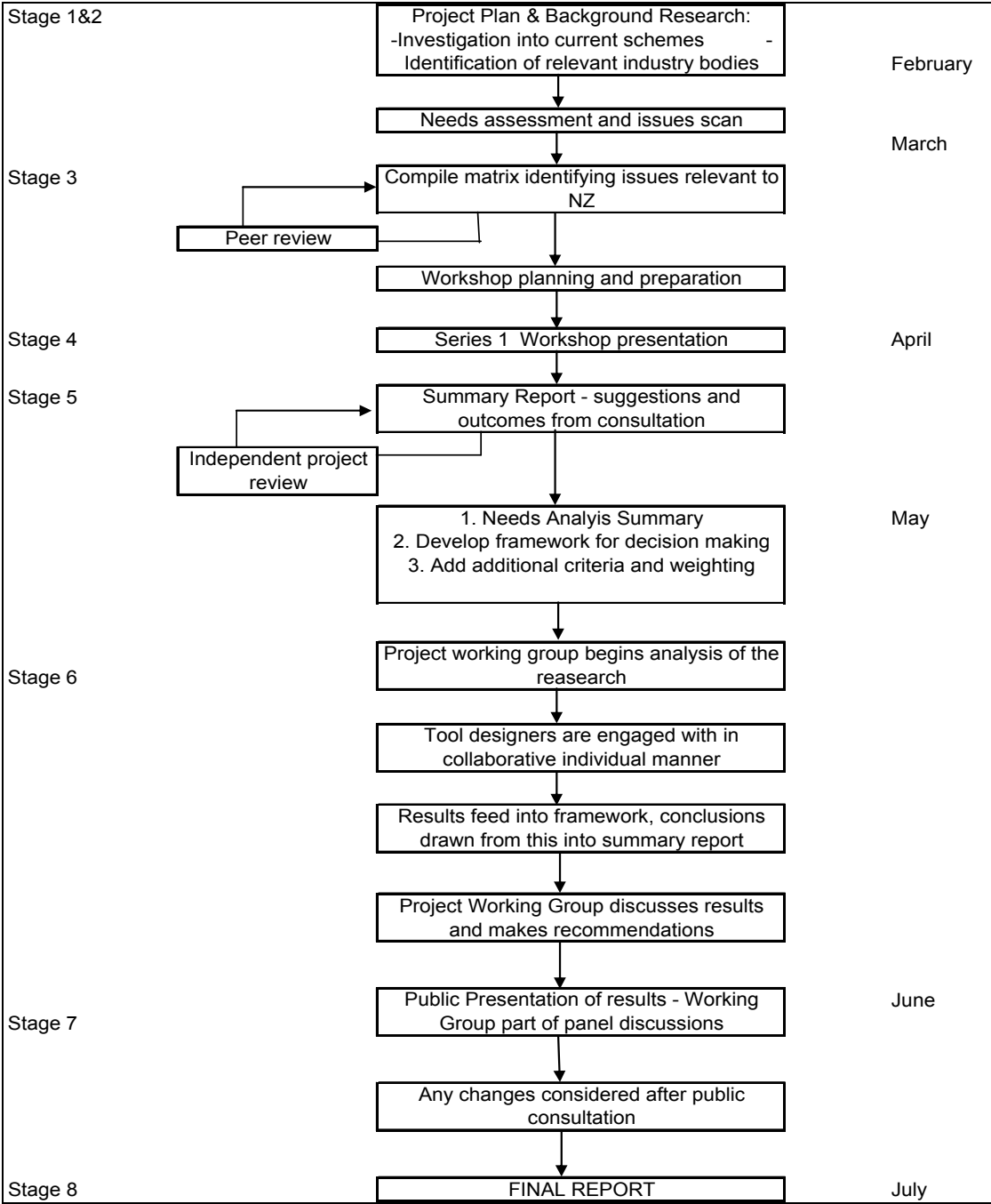
2.4 Tool Selection Process

Further consultation with tool designers and owners was entered into following the release of the completion of the research in April. The feedback from series 1 workshops was valuable for

identifying the most suitable tool for New Zealand and provided us with a clear understanding of market needs and likely adaptations of existing tools before the final decision.

Now that a final decision has been reached, the next step will be to adapt the details to render the tool suitable for New Zealand conditions, and begin to apply it to new building designs. This process is currently under negotiation by the New Zealand Green Building Council. Ongoing monitoring and review procedures will be necessary to ensure the continued success of the selected tool.

Figure 2-3 Outline of Project Methodology



3 Background Research: Australasia

3.1 Introduction

This section looks at the most widely accepted and relevant building assessment schemes used within Australia and New Zealand. Throughout the research process, commercial design tools have been targeted. Additionally, as part of this study we have also looked at performance-based tools such as NABERS. Each one has been examined in terms of the following:

- overall purpose
- types of building to which it applies
- general methodology
- use
- sponsor/owner of the tool.

A summary of the types of tools available is provided in Table 3-1, below.

Table 3-1 Summary of Australasian Tools Available

Tool	Country of Origin	Date est.	In use	Compulsory/voluntary	Market Penetration	Relevant to commercial sector	New/existing building	Local/global	Independent assessment
Green Globe 21	Aus	1994	Yes	Voluntary	Medium	Yes	New and existing	Global	Yes
Green Office Scheme	NZ	Under development	No	Voluntary	Currently 'parked'	Yes	New and existing	National	Yes
Green Star	Aus	2003	Yes	Voluntary	High	Yes	New and existing	National	Yes
LCA Design	Aus	Under development	No	Voluntary	Under development	Yes	New	National	N/A
NABERS	Aus	2005	Yes	Voluntary	Low	Yes	Existing	National	Yes
TUSC	NZ	Under development	No	Voluntary	Under development	Yes	New and existing	Local/national	N/A

3.2 Details for Australasian Tools

3.2.1 Green Globe 21: Design and Construct

Overview and Purpose

Green Globe 21 is a benchmarking and certification programme developed by The World Travel & Tourism Council (WTTC) in 1993 and officially launched in 1994. It facilitates sustainable travel and tourism for consumers, companies and communities. The design and

construct component of Green Globe 21 aims to facilitate environmentally sustainable design and construction of travel and tourism infrastructure and achieve the following:

- provide developers with guidelines for design and construction and assessment of performance
- enable travellers to recognise and choose travel and tourism operators that operate sustainably
- protect local ecosystems and the global environment.

Application

Green Globe 21: Design and Construct is designed for use in new and existing travel and tourism related buildings i.e. hotels, motels, guest houses, youth hostels, backpackers. Established in 1994, it is now in operation in over 60 countries worldwide, including New Zealand and Australia.

General Methodology

Green Globe 21 offers four separate tools: company, community, ecotourism and design and construct. The criteria used to define sustainable design and construction is as follows:

- design approach and sustainability policies
- siting
- conservation of energy
- selection of materials and process
- protection of earth, air and water
- construction processes
- response to social and contextual issues.

In addition, the developer: should have a written sustainable design and construction policy for its implementation; should comply with regulatory framework; should provide for measurement of specified performance indicators in both the design and construction phases; and needs a system in place for integrated management of the design and construction phases.

Users

Customers for whom assessments are done include developers, building owners, project managers, building design professionals, consultants and contractors, and consumers. The assessments are carried out by independent assessors, suitably qualified, experienced and accredited by Green Globe Asia Pacific (GGAP).

Green Globe also has an awareness (affiliate) programme, to help tourism companies understand methodology, benefits and requirements. Developers may undertake benchmarking independently of full certification.

Sponsor

Green Globe 21 has been developed by the University of New South Wales and the University of Queensland, in conjunction with the Sustainable Tourism Cooperative Research Centre of

Australia, which comprises 17 Australian universities, government tourism bodies and tourism business partners.

3.2.2 The Green Office Scheme

Overview and Purpose

The Green Office Scheme aims to promote offices that are more resource efficient, of low environmental impact, and healthy for occupants by recognising the impact they have on their occupants and their surroundings. This will be achieved by:

- promoting comfortable, practical designs that are environmentally sensitive
- encouraging and recognising healthier offices
- influencing the availability of environmentally sound products
- rewarding building designs that are above standard New Zealand building code requirements for environmental performance.

Application

In its pilot stage, the Green Office Scheme is both a predictive and retrospective tool for rating office buildings, through the use of three separate worksheets: design, existing and refurbishment.

General Methodology

Credits are awarded in the following categories:

- management
- health and wellbeing
- energy
- transport
- water consumption
- materials
- land use
- ecology
- pollution
- design excellence.

These are ranked according to importance and summed to give a total score and performance rating: good, very good and excellent.

Users

Trained assessors carry out the assessment for commercial building owners, developers, designers and commercial tenants. The designer is able to improve environmental aspects of the design before the final assessment.

Sponsor

This is a commercial environmental rating tool developed by BRANZ Ltd, but based largely on BREEAM (offices) (UK); with some aspects adapted from the US LEED tool. It is funded by the Building Research Levy and the Foundation for Research Science and Technology under their Public Good Science Fund.

3.2.3 Green Star

Overview and Purpose

Green Star is widely used in Australia, and has also been applied in the New Zealand context in the past, in the absence of a New Zealand-specific tool. The Green Star scheme is voluntary and offers a suite of tools, including office design, office existing and office as built. Each tool applies a rating scale:

- 4 Star Green Star Certified Rating: ‘Best Practice’
- 5 Star Green Star Certified Rating: ‘Australian Excellence’
- 6 Star Green Star Certified Rating: ‘World Leadership’.

The stated objectives that the Green Star tool aims to achieve are to:

- establish a common rating tool
- set a standard of measurement for green buildings
- promote integrated, whole-building design
- recognise environmental leadership
- identify building life-cycle impacts
- raise awareness of green building benefits.

Application

Green Star consists of a range of schemes to suit differing applications. Four schemes have been set up to date: office design, office as built, office interiors, and office asset, with more in development stages. To gain green star accreditation, projects must demonstrate that they meet all the requirements detailed in the relevant technical manual.

Though still relatively new to the Australian market, Green Star seems to have been well-received by the building industry.

General Methodology

Projects are evaluated against eight environmental impact categories plus innovation. The categories are:

- management
- indoor environmental quality
- transport
- energy
- water

- materials
- land use and ecology
- emissions.

Within each category, points are awarded for initiatives that demonstrate that a project has met the overall objectives of Green Star and the specific criteria of the relevant rating tool credits. Points are then weighted and an overall score is calculated, determining the project's Green Star rating.

Users

Assessments are carried out by Green Star accredited professionals. The types of customers for whom assessments are done include building owners, developers, architects and designers, builders, facilities managers and government agencies.

Sponsor

Green Star was based on the LEED and BREEAM schemes and is sponsored and managed by Australia's Green Building Council.

3.2.4 LCA Design

Overview and Purpose

The LCA design project was initiated to assess the status of life-cycle assessment (LCA) tools in the building and construction sector and to develop strategies to improve the uptake and use of these tools. This project aimed to improve the environmental performance of the building and construction sector, by promoting LCA as a tool for eco-efficient design, enhanced decision-making and reduction of environmental impacts. Within the industry, impacts occur through the manufacture of building materials, as well as throughout the design, construction, operation and demolition phases of all buildings. LCA is a widely recognised tool which can be used to improve understanding of the environmental impacts of this sector.

Application

The LCA Design package is intended primarily as a commercial design tool; though it is still under development and is not commercially available.

General Methodology

Life-cycle Assessment (LCA) is a method of evaluating environmental impacts of an activity throughout its life, from extraction of raw materials, to processing, transport, use and finally disposal. It is now an internationally accepted approach guided by international standards in the ISO 14000 series, and is being used by many organisations to model, analyse and guide environmental decision-making. Behind the LCA design tool is a software engine, which calculates:

- the volume and cost of all construction materials
- the environmental impact of those materials
- compliance with current industry standards

so users may redesign the building based on its economic and environmental impact.

Users

The tool is used by a range of people including building designers, purchasers, owners, developers, manufacturers and researchers. Use of the scheme is currently self-initiated, but it may be used in conjunction with other schemes involving formal assessment.

Sponsor

Developed in the Cooperative Research Centre for Construction Innovation, with CSIRO as the principal researchers.

3.2.5 NABERS

Overview and Purpose

The National Australian Built Environment Rating System (NABERS) is a voluntary tool that provides information on the sustainability of existing buildings in Australia.

It was developed to promote a shift in attitude towards the built environment. This in turn should lead to greater investment in sustainable building alternatives.

Application

NABERS is a newly developed retrospective tool, formally introduced in 2005. NABERS is different to most of the tools examined in that it targets existing buildings only, with separate rating systems for commercial office base buildings and commercial office tenancies. It was the intention that NABERS would be used in conjunction with design stage rating systems.

General Methodology

The developers of NABERS sought to provide an explicit and consistent rating system methodology, with a clear performance-based structure and a realistic and quantitative rating scale that recognises and rewards current performance levels and promotes best practice. The system is performance based, and works by assessment of the previous 12 months against the prescribed categories listed below to give a final percentage mark:

- energy use and greenhouse emissions
- refrigerant use
- water use
- stormwater run-off
- stormwater pollution
- sewage outfall volume
- transport
- landscape diversity
- toxic materials
- waste
- indoor air quality
- occupant satisfaction.

Scores of 35% are achieved through normal, sound architectural design; scores of 50% require serious consideration of environmental factors; and scores of 60% or more require a concerted and holistic approach to sustainability.

Users

NABERS Commercial is now in place for use by office building owners, managers and occupants.

However, government agencies and councils, planning and housing authorities, and utilities agencies may use the information provided by NABERS to encourage environmental improvements. Spreadsheets are free and publicly available to allow individuals to complete an assessment, as there is not yet a system for verification of ratings and accreditation or certification.

Sponsor

The Australian Government's Department of Environment and Heritage. In August 2004, the NSW Government's Department of Energy, Utilities and Sustainability (DEUS) was awarded the tender to make NABERS a commercial reality and are responsible for the full roll-out of the scheme.

3.2.6 TUSC

Overview and Purpose

Tools for Urban Sustainability Code of Practice, or TUSC, is a web-based analysis tool. Its purpose is to develop an interactive code of practice to ensure that urban planning and engineering is sustainable, and to improve sustainable management practices by raising awareness and understanding of sustainability issues by providing practitioners and decision-makers with appropriate tools and guidelines to ensure cost-effective sustainable urban development.

Application

The Tool for Urban Sustainability: Code-of-Practice (TUSC) will provide developers, practitioners, policy makers and compliance officers a single user-friendly web-based engineering and planning tool that will deliver cost-effective urban sustainability outcomes in both new developments and urban retrofit or intensification projects. The tool is primarily aimed at residential developments but can also assist with planning for commercial projects. It is the flexibility of use and how the data is accessed that was of interest to our research.

General Methodology

The Code of Practice for neighbourhoods is to be provided as a user-friendly, web-based toolbox system that includes linkages to models. It will provide performance standards for all key areas including social, economic and cultural as well as environmental, and works at both macro and micro scales, by assessing at the neighbourhood level, and considering infrastructure, etc. Though still under development, it is intended as a planning tool rather than a rating tool, and will be useful for resource consent procedures and site specific planning, such as land use and subdivision consents. As it is continually updated, the Code of Practice is more flexible and adaptable than some of the other tools.

This planning tool uses latest technology and can only be accessed via the internet. The development location can be selected using GIS, and further development plans added through a series of wizards and graphical tools. Proposed plans will be scored according to effect on the environment and prompts suggest sustainability techniques and technologies that would reduce these impacts. With time, as new features are added and improved, TUSC will become a powerful research and design tool. It will also be fully integrated with CAD and GIS packages.

Users

Due to its holistic approach, a multitude of potential users would benefit from TUSC. For best results it requires input from the broadest range of user groups. This includes developers, designers, homeowners, building owners, utility and infrastructure providers, council staff, planners and building consent officers. As a web-based tool it is readily available to any individual.

Sponsor

TUSC is a Sustainable Management Fund Project being developed by Waitakere District Council.

3.3 Concluding Comments

By far the most widely used tool within Australasia is Green Star, though NABERS may prove an effective tool for the assessment of existing buildings (or 'in-use' buildings) once it is more well-established. In New Zealand, only a pilot commercial tool has been developed, no scheme for commercial buildings has been formally adopted as yet.

4 Background Research: International

4.1 Introduction

International tools has been examined in a similar way to those above. This section looks at the most widely accepted, including BREEAM and LEED, which many of the Australian and New Zealand tools have been based on. A summary of the types of tools available is provided in Table 4-1, below.

Table 4-1 Summary of International Tools Available

Tool	Country of Origin	Date established	In use	Compulsory/voluntary	Market Penetration	New/existing building	Local/ global	Independent assessment
BREEAM	UK	1990	Yes	Voluntary	High	New and existing	National	Yes
LEED	US	1995	Yes	Voluntary	High	New and existing	Multi-national	Yes
LEED Canada	Canada	2000	Yes	Voluntary	Medium	New and existing	National	Yes
GBTool	Canada	2001	No	Voluntary	Low	New and existing	Global	No
CASBEE	Japan	2002	Yes	Voluntary	Medium	New and existing	National	Yes

4.2 Details for International Tools

4.2.1 BREEAM (UK)

Overview and Purpose

Building Research Establishment Environmental Assessment Method (BREEAM) was developed to assess the environmental performance of both new and existing buildings. It is now the world's most widely used assessment tool. Since its launch in 1990, BREEAM has been increasingly accepted in the UK construction and property sectors as offering best practice in environmental design and management.

BREEAM offers a range of benefits, from environmental to financial including:

- *compliance* with environmental requirements
- *environmental improvement*: in support of a wider corporate strategy or as a standalone contribution
- *occupant benefits*: to create a better place for people to work and live
- *marketing*: as a selling point to potential tenants or customers
- *financial*: to achieve higher rental incomes and increased building efficiency

- *best practice*: to provide a thorough checklist or tool for comparing buildings
- *client request*: responding to the requirements of users.

Application

BREEAM covers a range of building types: offices, industrial units, and, recently added retail units and schools. These can either be new or existing. Other building types, such as leisure centres and laboratories, can be assessed using a bespoke version of BREEAM.

BREEAM is the best established rating tool, having started in 1990. Since then it has gone through many iterations of the standards and adaptations to different market sectors. BREEAM has certified over 1500 projects and has been widely imitated internationally.

General Methodology

BREEAM assesses the performance of buildings in the following areas:

- *management*: overall management policy, commissioning site management and procedural issues
- *energy use*: operational energy and carbon dioxide (CO₂) issues
- *health and well-being*: indoor and external issues affecting health and well-being
- *pollution*: air and water pollution issues
- *transport*: transport-related CO₂ and location-related factors
- *land use*: greenfield and brownfield sites
- *ecology*: ecological value conservation and enhancement of the site
- *materials*: environmental implication of building materials, including life-cycle impacts
- *water*: consumption and water efficiency.

Credits are awarded in each area according to performance. A set of environmental weightings then enables the credits to be added together to produce a single overall score. The building is then rated on a scale of pass, good, very good or excellent, and a certificate awarded that can be used for promotional purposes.

Users

Clients, planners, development agencies and developers use BREEAM to specify the sustainability performance of their buildings in a way that is quick, comprehensive and visible in the market-place. Property agents use it to promote the environmental credentials and benefits of a building to potential purchasers and tenants. Design teams use it as a tool to improve the performance of their buildings and their own experience and knowledge of environmental aspects of sustainability. Managers use it to measure the performance of buildings and develop action plans, monitor and report performance at both the local and portfolio level.

Sponsor

BREEAM is developed and implemented by the UK's Building Research Establishment (BRE).

4.2.2 LEED (US)

Overview and Purpose

LEED (Leadership in Energy and Environmental Design) is a rapidly growing green building system developed by the US Green Building Council and released in 2000. USGBC has developed the system as a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. Through this tool they aim to encourage and accelerate global adoption of sustainable green building and development practices through “the creation and implementation of universally understood and accepted standards, tools and performance criteria” (LEED website).

LEED was created to:

- define “green building” by establishing a common standard of measurement
- promote integrated, whole-building design practices
- recognise environmental leadership in the building industry
- stimulate green competition
- raise consumer awareness of green building benefits
- validate achievement through third party review
- contribute to a growing green building knowledge base.

Application

The LEED rating system can be applied to almost any building project. Variations include:

- LEED-NC: new commercial construction and major renovations
- LEED-EB: existing building operations
- LEED-CI: commercial interiors projects
- LEED-CS: core and shell projects
- LEED-H: homes
- LEED-ND: neighbourhood development
- LEED application guides: retail, multiple buildings/campuses, schools, healthcare, laboratories, and lodging.

Additional versions are also under development. The LEED system has only been implemented since March 2000, but has already achieved widespread market acceptance, having been adopted by almost 1000 projects representing 4-6 percent of commercial floor-space annually.

General Methodology

The LEED tool works on a system of prerequisites and credits. There is a prescribed methodology for achieving LEED certification from registration, which ideally takes place during the early stages of project design. The LEED project checklist is used as a scorecard to identify prerequisites and award credits, which are collated to obtain a total score for the project.

Specific aspects are assessed under the following categories:

- sustainable sites
- water efficiency
- energy and atmosphere
- materials and resources
- indoor environmental quality
- innovation and design process.

The applicant project must satisfy all of the prerequisites and obtain a minimum number of points to attain a LEED rating level. Developers of the project will then earn a LEED certification plaque and certificate, and qualify for a growing array of state and local government initiatives.

Users

LEED has been developed for use as a tool by all building professionals. Registration is online and applications are assessed internally by LEED accredited assessors.

Sponsor

The LEED scheme has been developed and is continually refined by United States Green Building Council's (USGBC's) members, who collectively represent almost every sector of the building industry.

4.2.3 LEED Canada

The Canada Green Building Council launched LEED Canada for New Construction, the Canadian adapted version of LEED. LEED Canada for New Construction and Major Renovations Version 1.0 is an adaptation of USGBC's LEED Rating System, tailored specifically for Canadian climates, construction practices and regulations. All new construction projects in Canada now register with the Canada Green Building Council during project design.

Sponsor

The Canada Green Building Council is a broad-based inclusive coalition of representatives from different segments of the design and building industry.

4.2.4 GBTool (Canada)

Overview and Purpose

GBTool is the method used to assess the potential energy and environmental performance of the case study projects in the Green Building Challenge (GBC) process, an international effort to establish a common language for describing "green buildings", which now includes teams from 20 countries.

A feature of GBTool that sets it apart from existing assessment systems is that the software is designed from the outset to reflect the very different priorities, technologies, building traditions and even cultural values that exist in various regions and countries.

Application

GBTool software has been developed by Natural Resources Canada on behalf of the GBC group of countries and may not be used for commercial purposes, except as per agreements that may be worked out between potential users, the relevant national team and NRCan. So although it is not intended for direct application by end users, members of national GBC teams and others are free to draw from GBTool in whole or part for use in the creation of assessment tools. The current version of the GBTool provides the opportunity for more generic description of buildings with up to four different occupancies.

GBTool is designed to be applicable across a wide range of regions and building types. It thus follows a common approach and structure with adaptations made to suit national or regional needs.

General Methodology

The version of GBTool used in GBC2002 consisted of a single Microsoft Excel workbook which was broken into six worksheets: two were intended for all users (Intro and ID), followed by assessment worksheets and design data worksheets that contain scoring fields for all the sub-criteria and criteria. Weights assigned in earlier worksheets are applied to give a final score.

Section Four contains three worksheets: report, weight and result. These summarise and show results of the previous inputs. Performance scales for those criteria that are described quantitatively are automatically generated within GBTool by the difference between a “best” performance target and the benchmark or in terms of the percentage of resource saved or used.

The resulting quantitative scales are represented by absolute values derived from scaling between the benchmark and target values. This procedure is done automatically by algorithms built into GBTool so that, while the difficulty of deciding the target value remains, the opportunity for errors is reduced.

A critical feature of GBTool is that scoring is made relative to explicitly declared benchmarks. The choice of benchmark value is therefore critical in the overall performance assessment and a feature that requires clear direction and careful selection and use.

Users

The worksheets are divided into four main sections, arranged primarily according to those responsible for their completion: Section One is completed by persons who are not linked to the design, or by people who are undertaking the assessment; and Section Two is completed by a team of people who are knowledgeable about the design, presumably the designers themselves.

Sponsor

GBC (Green Building Challenge) is an international collaborative effort to develop a building environmental assessment tool that exposes and addresses controversial aspects of building performance from which the participating countries can selectively draw ideas to either incorporate into or modify their own tools.

4.2.5 CASBEE (Japan)

Overview and Purpose

The Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) is the Japanese assessment tool developed to promote environmental assessment of building design and encourage the implementation of sustainable building mechanisms based on new concepts such as Building Environmental Efficiency (BEE). It is intended to provide an incentive for building owners, designers and users to develop high-quality sustainable buildings.

Application

The basic CASBEE tool suite was introduced in 2002 and is applicable to a diverse range of individual applications, but there are four main variants of the tool to suit different applications: pre-design, new construction, existing building and renovation.

Pre-design: To evaluate the basic environmental impact of the project and select a suitable site.

New construction: A self-assessment check system that allows architects and engineers to raise the BEE value of a building during the design process.

Existing building: A tool to target existing building stock, based on operation records for at least one year after completion.

Renovation: There is growing demand for building renovation, especially in Japan. This tool is designed to ascertain the degree of improvement (increased BEE), relative to the level that preceded renovation.

General Methodology

Two score sheets are filled out by an assessor at each design phase. Under CASBEE there are two categories, internal and external. These two factors are coded Q and L, and are evaluated separately. These are further divided into sub-categories as Q-1 (Indoor Environment), Q-2 (Quality of Service) and Q-3 (Outdoor Environment on Site); and LR-1 (Energy), LR-2 (Resources & Materials) and LR-3 (Off-site Environment). A five-level scoring system is used, with a score of level 3 indicating an “average”. Scores for each assessment item are then multiplied by a weighting co-efficient according to importance.

- **Q (Quality): Building Environmental Quality and Performance:**
Evaluates improvement in living amenity for the building users, within the site.
- **L (Loadings): Building Environmental Loadings:**
Evaluates negative environmental impacts beyond the property boundaries.

CASBEE also ensures the following four assessment fields are covered: (1) energy efficiency; (2) resource efficiency; (3) local environment; and (4) indoor environment

Users

CASBEE is a self-assessment tool to help owners, planners, architects and engineers develop better and more sustainable building practices.

Sponsor

CASBEE has been developed by a Japanese Sustainable Building Consortium.

4.3 Concluding Comments

There are a large number of environmental rating systems internationally, but only several have gained significant market acceptance and use. The two that have achieved greatest prominence within their respective market sectors are LEED in the US (including LEED Canada) and BREEAM in the UK, though it is likely that others will become more widely accepted as they are further developed and improved.

5 Industry Consultation

5.1 Introduction

The project design has enabled industry consultation at all stages, both publicly and as part of the decision-making process. The aim of the first series of workshops was to obtain specific feedback and more general comments or gaps which are summarised in this report. The data gathered was collated and analysed to determine the areas of highest importance to the New Zealand building industry. This data also formed the basis of the needs analysis of the market. A smaller more focused group of industry representatives was formed from the workshops. This group met to define the decision-making process, assess all 14 tools against the criteria outlined in 6.1.2, and help propose a solution for New Zealand.

5.2 Performance Measurement Priorities

A review of major rating tools in place around the world found that many had categories and topics in common. Ten key topics were identified to represent all major areas measured by these rating tools. Under each of these topics a number of criteria exist as ways of measuring impact and performance in these areas. The relative importance of these 10 key topics, (refer Table 5-1) and the underlying measurement criteria, were discussed and evaluated during the workshops. The intent of this exercise was two fold:

1. To gather data that can be used for regional weightings and to facilitate discussion on what rating tools do and do not measure (see Appendix I).
2. For participants to gain greater understanding about what tools do and do not measure.

The individual group results from this table (Table 5-1) have been combined to give the overall results supplied below. These results show that energy is emerging as the top overall priority in all three centres when rating the 10 topics assessed. This is followed by indoor quality and transport. Under each topic, important issues were examined. These were also put into priority order by the workshop groups to identify what a green building rating tool would need to measure.

An important theme that arose throughout the workshops, was the clear need for an integrated approach to designing and assessing the relative sustainability of buildings. While some areas are of higher importance than others, none of the lesser ranked issues can be ignored. Attendees particularly highlighted the importance of appropriate systems, procedures and plans to ensure satisfactory implementation of measures, and the need for a flexible scheme that can be adapted to suit changing needs.

Table 5-1 Topic Ranking Overall and by City

Topics measured by the tools we are looking at	Overall	AKL	WTG	CHC
Energy efficiency	1	1	1	1
Environmental quality within the building	2	2	2	5
Transport	3	3	6	8
Materials	4	5	6	6
Management systems, procedures and plans	5	6	4	3
Land use and ecology	6	4	3	3
Water efficiency	7	8	9	9
Flexibility and adaptability	8	9	5	2
Emissions, effluent and pollution	9	7	8	6
Quality, service and risk	10	10	10	10

5.3 Findings from Industry Consultation

The following areas have been identified during the background research and workshop discussions.

5.3.1 Design vs. Implementation

A number of participants raised the concern that a number of new buildings assessed under some of the international systems have only been granted a high rating on the design of the building and have not yet received a rating on the complete built form. This raises the challenge of a green building rating tool not having any requirements to assess the performance through the stages of design, build and use. Similarly, it is important to recognise the difference between owner and tenant responsibilities, and some existing tools account for these differences. To address this, flexibility in applying a rating system for the building owner or tenant may be required to focus on varying aspects of the buildings performance.

Management procedures are highlighted to be very important to the overall ‘sustainable impact’ of the building, though they are more reliant on user behaviour and therefore more difficult to integrate into a rating tool for the design and construction phase. Most people recognised that even the best management systems, plans and procedures were of no use without measures in place to ensure that these are implemented satisfactorily.

If the design and operational phases are separated, as suggested in workshop feedback, some of the priorities will change. For example, a management system is higher priority for the operational phase, though management criteria will need to reflect design, construction and operation.

5.3.2 Holistic Approach

Many workshop attendees stressed the importance of holistic approach based on the concepts of ecological footprint or a triple bottom line approach, because complex interrelationships are involved. These concepts have been looked at by tool developers in the past, and have not been ruled out for future inclusion, if this meets market needs and can be practically implemented. It is also important that weightings reflect actual environmental benefits.

Input from one of the workshops suggested that a holistic approach can best be achieved by identification of overarching principles or a high level framework that defines what ‘green’ or ‘sustainable’ actually is. Such a framework may make it easier to prioritise while not ignoring important issues or losing sight of the overall goal.

5.3.3 Regional Differences

Over the course of the workshops it also became clear that there are regional differences and considerations (see table 5-1), and these considerations need to be taken into account, especially when assigning weightings within a tool. All centres favoured energy efficiency as the top priority, though unsurprisingly the Auckland group ranked transport higher than other centres (#3) while Christchurch groups placed water efficiency as a top priority (#2). Other areas of high importance were internal environmental quality (Auckland and Wellington), land use and ecology (Wellington and Christchurch), and management systems (Christchurch only). Using some of these ideas it may be possible to have a regionalised scheme with regional targets, dependant on the needs of the general public and the nature of the built (and natural) environment in that region.

5.3.4 Involvement and Awareness

A significant finding from the workshops is that people from all different sectors want to be involved in the process of tool selection and implementation and have the opportunity to voice their opinion on important matters. It is essential that the NZGBC encourage this by running public events and speaking at industry organisation meetings to update people on a regular basis, thus facilitating ongoing public participation. Membership to NZGBC will be opened up later this year and will include regular updates and newsletters to keep people informed.

There is a diverse degree of understanding as to the various tools available both onshore and internationally, and how they might be used in New Zealand. This needs to be kept in mind in terms of communication associated with tool selection, customisation and implementation. Information on tools and their use can be sourced through the input of local experts who have been involved with both the development of tools in the past and have used assessment tools on projects both locally and internationally. The NZGBC plans to put in place an education programme and a combination of networking functions soon to fill this gap.

5.3.5 Communication and Language

Communication of the principles and processes behind the rating tool needs to enable both technical experts and lay people to use and understand the tool. Workshop participants observed

that the wording used in some green building tools is ambiguous and, in places, repetitious. The workshops were particularly effective in highlighting these points for consideration in future tool development.

5.3.6 Legislation

It was noted that some of the issues put forward at the workshops, such as asbestos minimisation, particularly for a building design tool, are already regulated in the Building Code and it would therefore seem unnecessary to include them in a green building assessment, and unsuitable to grant credits for taking account of them. For a building to gain green building credits it must go beyond the minimum requirements set down by legislation.

District and regional planning should also be taken into consideration, as many of the issues that arise as part of building development, such as transport and resource management, are part of bigger urban design problems and planning.

5.4 Feedback on Tool Content

One of the key benefits of the workshops was the opportunity to present the issues that are most commonly addressed by existing green building rating tools (Table 5-1) and to ensure that none of the issues that are important in New Zealand have been overlooked. Very few gaps in the data were found by those attending the workshops, but it became apparent that some of the more important issues have not been given adequate consideration by some of the tools researched. For example, groups expressed concern at the lack of consideration given to embodied energy, aspects of water quality and full life-cycle analysis.

In addition to the rating exercise requested at the workshop, comments were welcomed. Appendix E lists the issues identified before the workshops, under the relevant topic, and the comments received are summarised beneath the topic that they apply to.

Comments on the tool content are summarised in Appendix E.

6 The Selection Process

6.1 Overview

The tool selection process directly involved both industry consultation and interaction with specific tool designers. As stated earlier, the NZGBC worked with key industry representatives to provide a workable framework for a New Zealand based assessment tool. Specifically, the NZGBC facilitated meetings with the Project Working Group to undergo the following steps:

- examine existing tools based on research provided by URS NZ Ltd
- identify a green building rating tool or suite of tools appropriate for New Zealand commercial office buildings
- develop an associated plan for adaptation and implementation.

Meanwhile, representatives from the NZGBC initiated discussions with tool designers regarding the feasibility and conditions of adapting their respective tools. After the Project Working Group had identified a preferred structure, taking into consideration preliminary responses from specific tool designers, a discussion panel was held to obtain further feedback from the wider public.

The preferred tools for adaptation were Green Star (Australia) and Green Office (BRANZ, NZ). The process for adaptation of the tools will be addressed in section 8.

6.1.1 The Initial Focus With a View to the Future

The NZGBC has identified a distinctive market need for a commercially focused tool, which would eventually exist as part of a suite of tools. Our approach was to use this opportunity to develop the framework and then focus on developing the suite of tools inside that framework. It is clear there is strong demand from government agencies and large corporate tenants who are acting on their capacity to reduce their environmental footprint, and see the buildings they occupy as an achievable way they can do this.

6.1.2 Tool Evaluation Criteria

The following is a range of decision-making criteria which were used by industry representatives in the Project Working Group to evaluate each tool:

- applicability to New Zealand conditions
- any barriers with legislation frameworks
- simple interface
- ability to adapt the tool for NZ conditions
- what characteristic does the tool measure; does it cover a broad enough range of social, environmental and economic issues?

- how is performance of the building measured?
- other considerations that could be important.

It is important to note these criteria were used as a guide for debate and discussion. Namely, members of the Project Working Group were specifically invited to put forward their perspective on each tool as a spokesperson for the key industry group. Project Working Group members represented: owners/developers, government, project management professionals, architects, engineers, NGOs, academics, materials manufacturers, and contractors. This resulted in valuable feedback both for the tool selection process and looking forward to the adaptation and implementation stage.

The more technical considerations that were discussed by the Project Working Group, with Michael Field providing the expertise to the group, were the following:

- What stage of the buildings life-cycle the assessment tool focussed on?
- What issues were measured within the assessment framework (full list of areas included within each framework were assessed)?
- How were these issues measured and assessed (for example, does the assessment framework award credits for consideration of a particular issue or does it require a measurable outcome)?
- Were the issues identified during Workshop 1 missing from any assessment frameworks? Can we rule these out immediately?
- How did the assessment frameworks allocate weightings, credits and reward sustainable practices?
- Would this system or process be comparable with other schemes (eg, LCA)?
- Were weightings attributed to certain issues able to be changed to reflect New Zealand's specific requirements?
- Was the assessment framework targeted at world's best practice or more at a compliance level?
- Where there measurable issues specific to the assessment frameworks country of origin and were these able to be removed or replaced?
- How did the assessment framework calculate the final assessment score and how was this final score articulated for example, number of stars, a ratio, from 1 to 100 etc and could this be changed if not suitable?
- Were the frameworks updated regularly and how easily was this achieved?
- When was the framework last updated and how current were the issues addressed?

6.2 Final Decision and Evaluation

Final selection of the tool structure followed a “funnel” approach, which began with a number of leading international assessment tools. The NZGBC, in conjunction with the Project Working Group, systematically narrowed the original tools down to the final two tools according to the above criteria. Specifically, Green Star and Green Office Scheme have been identified for further investigation and possible development. However, elements of NABERS are of interest for the “in use” aspect of building performance, and we suggest further discussion with these tool designers to look at possible incorporation into a suite of tools.

6.2.1 Further Industry Consultation

A final public presentation held in the main centres in mid-June gave an outline of the process involved in tool selection and invited questions, comments and concerns for discussion from stakeholders, industry members and other interested parties.

In particular, the technical aspects involved with the introduction of a rating scheme were discussed. Outcomes from these workshops are summarised in Appendix I.

7 Final Recommendations

7.1 Tool Selection

The decision reached as a result of the selection process is to adopt the basic structure and interface of the Australian-based Green Star tool, which is already widely used by Green Building professionals in New Zealand.

This tool will need to be adapted and implemented to take account of the New Zealand-specific requirements of a building rating tool, to address the issues identified during the consultation process, and to meet the current needs of the New Zealand building and construction industry. To achieve this it is recommended that the technical weightings and additional measuring criteria of the New Zealand-designed Green Office Scheme, a tool developed by BRANZ, be incorporated into the Green Star framework.

7.2 A Graduated System

A significant issue arising from the analysis of some of the existing building rating tools is that of design certification versus certification of existing building stock, and the problem of fully accredited building designs that either fail to function as sustainably as desired, or that are not built to design specifications (Sustainable Insight – issue 0603, March 2006).

The issue outlined in the statement above, is one of considerable concern to those who design and manage rating tool systems. This has been discussed at length during the project and has led the NZGBC to identify the possible areas for improvement to maintain the integrity of the entire suite or system of rating tools. The main issue identified *is the gap between the building life-cycle phases and the ability to assess and understand the actual performance of the building.*

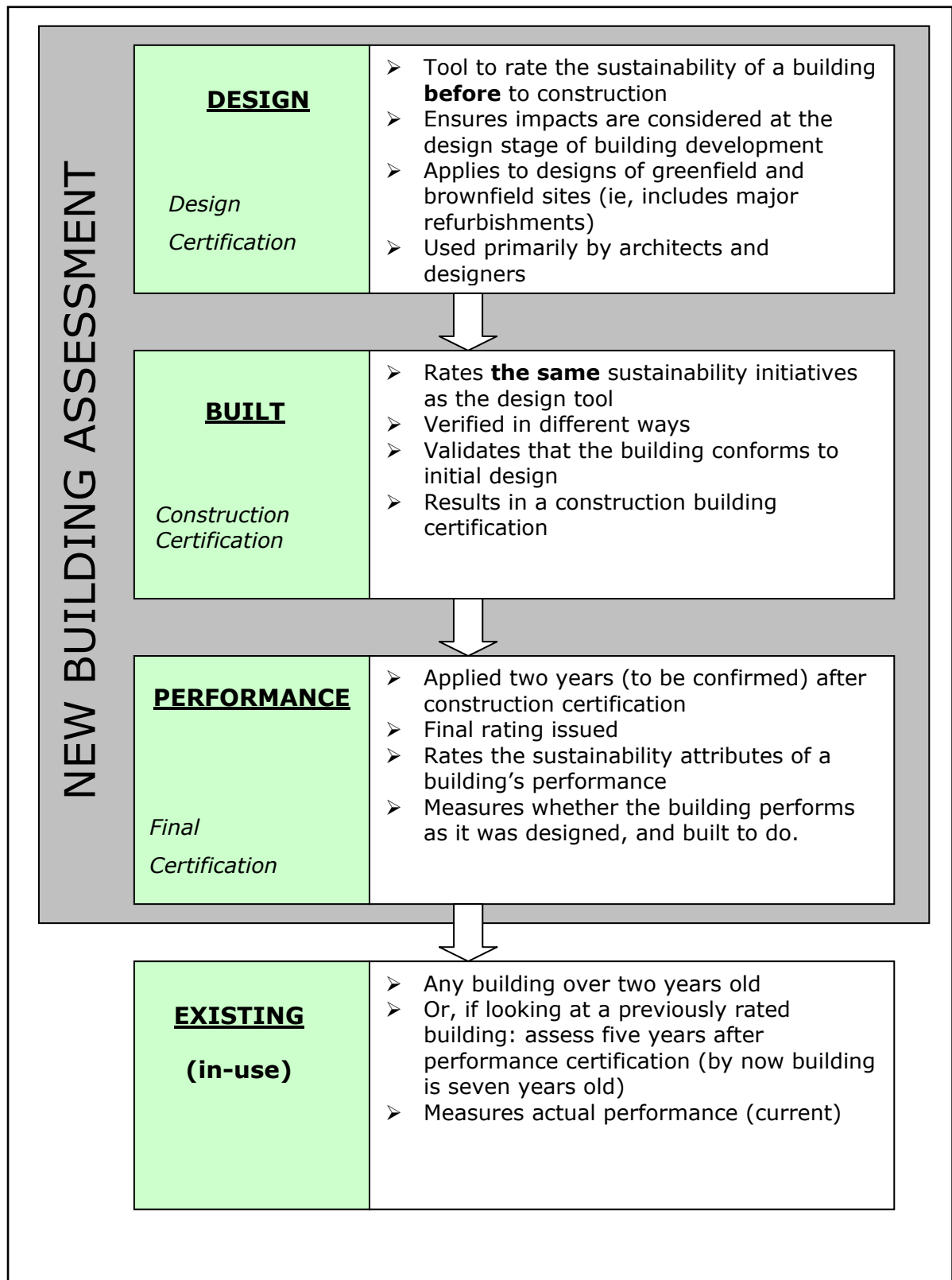
To address this matter it is recommended that the solution for New Zealand is to take a phased approach to focus on continuous improvements to sustainability factors of new building design, construction and management while including the ability to assess and improve New Zealand's existing building stock. It is anticipated that such an approach will improve the overall sustainability and urban design in New Zealand cities.

The structure proposed consists of four integrated phases as shown in Figure 7-1. In developing a new building that will rate highly with the NZGBC, preliminary certification can initially be granted in the design phase. Once the building has been constructed it can be certified through verification that the design was delivered to the same standard. A final commission period of around 1-2 years (estimate), is needed before a final performance certification is issued, once it has been established that the building performs as expected. The period of up to two years is suggested, to enable the building operator enough time to finalise the 'building tuning' process.

It is suggested that a certification timeframe such as five years (length to be decided), be given to each certified building. After that the certification will lapse and the building will be reclassified as an 'existing building'. It will then be reassessed and certified using an existing building (in-use) rating tool. This certification is ongoing and re-evaluation can occur on a regular basis to ensure the building retains its level of efficiency and performance.

The approach is designed to avoid the problem that many international tools now face, where buildings receive a rating and keep this rating indefinitely, irrespective of its performance. This could lead to market confusion when comparing a new highly rated building with one constructed 5–10 years earlier, where the requirements to meet a “high” standard will be harder to achieve and therefore the efficiencies expected would be greater. This is a marketing and communication exercise and is the same for any standards where best practise benchmarks will continually get higher with experience, innovation and understanding.

Figure 7-1 Components of the Proposed Assessment Framework



7.3 Additional Adaptations

Although the GBCA's 'Green Star' and BRANZ's 'Green Office Scheme' are the primary tools recommended for use in the New Zealand environment, the analysis identified aspects of other tools that are relevant to the objectives of the NZGBC.

Specifically, aspects of NABERS were identified as applicable for the assessment of existing buildings. It is recommended that the relevant aspects of this tool be considered and discussions be held with the tool owners.

7.4 Adaptation Process

Negotiation with the tool owners/designers is almost finalised in order to purchase/obtain permission for adaptation and implementation by the NZGBC for the New Zealand market. The Green Building Council of Australia has now formed a sub-committee of their current board to have a formal process to interact with the NZGBC.

A partnership has been formed with BRANZ to supply their considerable expertise, to help adapt Green Star using the data and resources that exist from the Green Office Scheme. This three way partnership is crucial to the success and speed of delivery of the first tool in the suite.

Draft Process for the Adaptation of Green Star and Green Office Scheme

Position: Green star will be used as the framework, with seven categories plus innovation. Each credit will be compared to the equivalent within the Green Office Scheme and only changed in the following situations:

- if the language in Green Office Scheme is more appropriate for the New Zealand market
- if the Green Office Scheme improves the robustness of the overall tool
- if for any reason a change is viewed by the sub-committee to improve the end result of the tool
- if the measure is more performance focused
- many weightings will change for New Zealand regions (including bio-regions).

The end result needs to be that we have a product that is Green Star for New Zealand whereby buildings can be directly compared to those that have a similar star rating to those in Australia.

A rating tool sub-committee will be established as a board sub-committee. This will be made up of stakeholders from all major parts of the building value chain (approximately 15 members). The aim is to design the processes in an inclusive manner to involve multiple stakeholders to achieve a market-based solution that suits New Zealand. Each person represents the perceptions and needs of their part of the industry in the value chain. This will be a platform to discuss, debate and decide what we want the tool to deliver and how that can work technically, with a number of technical experts as part of the sub-committee, from New Zealand and Australia.

This process is aimed at covering the rationale and theory, as well as the topics and how they are pieced together, into a product – 'a rating tool'. There is a considerable amount of work that BRANZ Ltd will be contracted to carry out as a result of the sub-committee meetings. BRANZ will work through the detail of the tool based on the higher level decisions made when covering

each topic. After several one day sessions and other meetings BRANZ will then present back to the group an 80% finished version for the sub-committee to make further changes to and identify any issues that arise. Once the sub-committee is confident that the tool is 98% right, it will be released in a draft version to the market for 90 days. After this period there is an opportunity to make small changes based on the feedback received before the final tool will be launched and certification can begin.

8 Conclusion

8.1 Overview

The aim of this project was to develop a sustainable commercial building assessment scheme for use in New Zealand as requested by the Ministry for the Environment. To ensure the appropriate direction was taken for New Zealand with the development of a scheme, evaluation of the most widely used building rating schemes from around the world was conducted, then discussed with the industry at large.

During this evaluation and industry consultation process it became clear that tools are not *singular* but operate as a suite of tools and are chosen depending on the stage of a building life-cycle; *design, construction, operational and existing buildings (or retrofit) and interior fit-outs.*

This investigation and market consultation for the Ministry for the Environment has highlighted several other key factors.

1. The level of knowledge of what sustainable building assessment schemes (or rating tools) are and how they are used is relatively **low** in New Zealand. It is therefore critical for the success of any scheme that there is an increased level of knowledge within the industry to both create demand for green building and increase the capacity of the industry to deliver high performing green buildings for New Zealand. The Green Building Council is set up as a vehicle for the delivery of information and education, and we seek to partner with government and other organisations to meet these requirements.
2. Industry feedback requests that any tool for New Zealand focuses on the end result; *the performance of a building*. This single request has influenced the thinking of the NZGBC and what we are recommending. Historically rating tools focus on the design phase of the building and do not include measures or processes to truly understand the actual performance of the building when in use.

With this understanding of how schemes operate and a good understanding of what the New Zealand market wants, we will begin the next phase of adapting the technical aspects of the New Office Design and Construction (As Built). Once they are released as draft versions we will begin work on both a performance measurement tool and existing building tool together with GBCA and BRANZ.

8.2 Critical Steps

Now that a decision has been reached, apart from the technical work that will be begin, there are a number of subsequent steps necessary to ensure the successful introduction of a building rating scheme to the New Zealand building industry. These include:

1. The findings of this report need to be reviewed by the Ministry for the Environment to ensure that the proposed scheme is in line with such initiatives as the Govt³ programme with the view that this tool can become a recommendation for best practise for Govt³ members.

2. Ongoing discussions with GBCA and BRANZ are required, regarding the planned adoption and implementation of intellectual property, including an accurate estimation of the timeframes involved, costs incurred, ownership and marketing requirements for each tool that is developed.
3. Industry awareness and support for the scheme needs to be facilitated through ongoing public engagement.
4. Education of key stakeholder groups is required to ensure the scheme is well-received and successfully adopted into the market-place. It is important that the NZGBC rating tools system meets the needs of the market so other tools are not developed by government or industry organisations that could cause market confusion and dilute the effectiveness that is possible through collaboration.

8.3 Implementation Plan

Following a similar model to the GBCA, tool development requires sponsorship. The budget required to successfully develop, launch and manage Green Star for New Zealand is \$150,000. This will be funded mostly by industry and government at the following levels of engagement:

PLATNUM	\$50,000
GOLD	\$20,000
SILVER	\$15,000
BRONZE	\$10,000

As there is already a lot of interest in this sponsorship, work will begin at once.

Milestone targets:

AUGUST 2006	Sub-committee formed
SEPTEMBER 2006	Sub-committee developed clear plan and process
	Memorandum of understanding with BRANZ and GBCA complete, work begins
OCTOBER 2006	Funding secure
	Sub-committee begins work
NOVEMBER 2006	Tested on pilot buildings
	Reviewed and changes made
DECEMBER 2006	Draft released to market
MARCH/APRIL 2007	Official launch, certification begins.

This timeline is based on cooperation of many stakeholders, it is agreed that we can deliver to this timeline, but in the case of unforeseen circumstances we request your understanding if we are to extend slightly if required to deliver a quality tool to the market.

8.4 In Summary

This project has gathered together a great deal of information on sustainable building practices, both in New Zealand and overseas. However, the data contributing to the direction taken has not been solely of a technical nature.

Early on in the process it became apparent that market acceptance and support from industry will be essential for the successful implementation of a sustainable building rating scheme. As such, industry consultation and engagement have been a priority throughout the course of the project. The result is a high level of interest in the concept of green buildings, both from the public and commercial sectors, with a lot positive feedback which exceeded our expectations.

Our partnerships the Green Building Council of Australia and BRANZ Ltd are the first step of the implementation process. In addition, market drivers such as the Govt³ programme are well-placed to drive demand for “green buildings” and the use of these tools once developed for New Zealand.

The Green Building Council is committed to partnering with government to ensure we can continue to improve the performance and reduce the impact of the built environment in New Zealand.

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Appendix A: Invitation and Outline for First NZGBC Workshops

New Zealand Green Building Council

Workshops: Industry consultation for the adoption of a sustainable building assessment scheme

Auckland 4 April 1 – 4.30pm

Venue: Town Hall

Wellington 5 April 1 – 4.30pm

Venue: Thinktankz

Christchurch 6 April 1 – 4.30pm

Venue: Environment Canterbury

Facilitator: Susan St Lawrance

The aim of the workshops is to consult as widely as possible on the different options for New Zealand in the adoption of a sustainable building assessment scheme. We would like to get as much input into the decision-making process as possible. The workshops need to encourage conversation and debate about: what is assessed in rating systems; what is not assessed; what is needed in a rating system for New Zealand; how we can design a system that will have a high level of market acceptance and use.

The workshops need to be pitched at a level that people do not require expertise in assessment systems but understand the need for standards to improve areas of sustainability to improve the performance and reduce the impact of buildings in New Zealand.

Agenda:

- | | |
|---------|--|
| 12.30pm | Doors open, name badges, welcome |
| 1.00pm | Facilitator welcomes people and outlines the agenda
Welcome from Jane (5 minutes) |
| 1.10pm | Facilitator introduces Michael Field (in Wellington & Christchurch Jane will do this)
Process of the project
Technical info |
| 1.25pm | Facilitator outlines workshop process |
| 1.30pm | Table discussions – A3 sheets of paper with one topic heading on each sheet: <ul style="list-style-type: none">• energy efficiency• environmental quality within the building• transport |

- water efficiency
- land use and ecology
- emissions, effluent and pollution
- quality, service and risk
- flexibility and adaptability.

On each sheet it will have all of the topics that are measured from all 6–8 of the rating tools that we are looking at. These topic such as Thermal comfort, or VOC minimization will then be ranked in order of importance from 1–10 (1 being highest importance and 10 being lowest importance), with each table needing to reach an agreement on the priority ranking. Topics that are considered to be not included need to be noted on each sheet as well.

These additional topics must also receive a ranking from 1 to 10. This will demonstrate where the topic should sit, in comparison to the other issues already ranked.

Note: The sheets will be collected at the end of each time period, to encourage participants to move onto the next topic.

2.30pm	Table change. Groups changed to mix people up
3.00pm	Working afternoon tea.
3.30pm	Change groups again
4.15pm	Facilitator wraps up
4.30pm	Thank you, and close

Appendix B: Expression of Interest Letter to Tool Designers

Dear

The New Zealand Green Building Council has been in establishment for almost 12 months now. As with most other Green Building Council's worldwide the establishment of a National Building Assessment Scheme is one of our key priorities. Our first opportunity to interact with you is focusing on developing this scheme for New Zealand. We are currently gathering information about assessment or rating systems around the world, so we can form a sound and informed decision as to what will best suit the New Zealand market and environment.

Initially we are seeking written information and background about your tool(s) for us to analyse against other tools that may be suitable for New Zealand. We have provided a Matrix to try and simplify the information we would like from you. This is attached and explained within the document. We understand that there may be IP issues with the use of your tool(s) and the aim of this matrix is to gather information before we need to discuss contractual issues and licence possibilities, but if you need to do this first please contact me to discuss, or alternatively send relevant information on possible adaptation licences, ownership of IP, maintenance contracts, charges or profit share arrangements that could help us in our decision to choose a tool for New Zealand.

Aside from the scientific aspect of this matrix, we will also be considering factors such as, saleability, market acceptance, cost to run, simplicity, user friendliness, adaptability, and international benchmarking, so any additional information you can provide us will be extremely helpful.

The NZGBC is taking the approach to work with existing building rating tools and their designer to evolve and adapt the substantial amount of work that has been done and market tested. Our approach is to innovate within existing frameworks to find the best solution for New Zealand.

If you would like to discuss this further please contact me. Thank you in advance, for your time and input.

Warm regards,

Jane Henley
Establishment CEO
New Zealand Green Building Council Inc.
jane@nzgbc.org.nz
office: +64 9 3669626 ext 770
mobile: +64 21400 612
Post: PO Box 10-352
Wellington

Appendix C: Instructions for Completion of Matrices

Instructions for completion of spreadsheets.

Firstly, I'd like to thank you for taking the time to provide the New Zealand Green Building Council with this information about your assessment frameworks. The purpose of this information gathering exercise is to allow you the opportunity of listing the various topics that your tool measures or rates. This will allow the New Zealand Green Building Council to assess the various different tools available and make recommendations to the New Zealand Ministry for the Environment on which tool or tools would be most suited for adaptation and adoption in New Zealand. For ease of use, the spreadsheets have been separated into the various different topic areas, as listed below:

- management systems, plans and procedures
- environmental quality within the building
- energy efficiency
- transport
- water efficiency
- land use and ecology
- emissions, effluent and pollution
- quality, service and risk
- flexibility and adaptability
- other.

Could you please fill out, under your tool's heading, the various different areas measured under these category headings (examples are given at the bottom of each spreadsheet). If there is any area that is measured, that does not fit well into the existing category headings, please include these in the "other" section. For those tools that exist as a suite ie, broken down into different building types, these have been listed with a corresponding letter for example a, b, c, d and so on. Can you also include, after the description of what is measured, the corresponding letter of the particular tool or tools that this relates to. An example might be:

Management Section

Environmental management plan (a, c, d)

This would denote that an environmental management plan is included as a measured area in tools a, c and d.

Should you have any queries relating to this request, please feel free to contact me:

Michael Field

Sustainability Consultant / Green Building Professional

URS New Zealand Ltd

(on behalf of the New Zealand Green Building Council)

Tel: +64 9 355 1346

E-mail: michael_field@urscorp.com

Appendix D: First NZGBC Workshop Attendees List

Registrations

Rating Tools Workshop 1 – Auckland

Rochelle Ade	Carson Group
Dan Allen	CBRE
Treiz Azzu	Opus International Consultants Ltd
Kim Bannon	Jones Lang LaSalle
Simon Barnes	Davis Langdon
Leanne Beard	Soul
John Bennett	Chemvin Plastics Ltd
Geoff Bennett	Energy and Technical Services
Allanah Berry	URS
Fabienne Bovis	Canadian Consulate
Walter Breustedt	ECOM
Connan Brown	Norman Disney & Young (NDY)
Warner Brunton	Connell Wagner
Jan Burbery	Auckland City
Hans Buwalda	Fletcher Building Ltd
William Carter	Generation Developments Ltd
Allan Catterall	InterfaceNZ Ltd
Gary Caulfield	MPM Projects Ltd
John Clancy	Renovation Masters
Nick Collins	Beacon Pathway Ltd
Nigel Cook	Nigel Cook Architects
Rennae Corner	Auckland City Council
Alec Couchman	Warren and Mahoney
Hamish Davies	Avery Team Architecture
Bob de Leur	Auckland City Council
Steve Duncan	Cavalier Bremworth Ltd
Brendon Dwyer	Beca Carter Hollings & Ferner
Phil Eaton	Multiplex
Mitra Emami	Opus Architecture
Susan Ensor	Auckland City Council
Sue Evans	Auckland City
Grant Ewen	Rider Hunt Terotechnology
Blair Farquhar	Wingate+Farquhar
Jamie Fear	CMS
Robert Ferguson	Exotic Planters Ltd
Michael Field	URS New Zealand / New Zealand Green Building Council
Anne Foy	Waitakere City Council
Terry Gill	Peddle Thorp Architects
Hunter Gillies	Jasmax Architects
Kevin Golding	Winstone Wallboards Ltd
Jude Green	Style Plantation, Renewable Resources
Rob Guild	Foodstuffs (Auck) Ltd
David Gunn	Stack

Graham Hadlow	Style Plantation
Jason Happy	Kiwi Income Property Trust
Rachel Hargreaves	BRANZ Ltd
Lester Haycock	CMS
Ben Hayes	RTA Studio
John Heap	Sinclair Knight Merz
Jane Henley	NZGBC
Dan Heyworth	Arhaus
Kevin Hide	URS
Roger Hill	PAWA (Plants at Work Assoc of NZ Inc) and Rainbow Hire Plants Ltd
Stephen Hobbs	South Pacific Waterless Ltd.
Hamish Holder	Eco Insulation
Megan Howell	ARC
Warren Jackson	
Priteshkumar Jayswal	Student Auckland University
Paul Jones	ECO-Block New Zealand
Paul Jurasovich	JASMAX
Maurice Kiely	Chow:Hill
Lorraine Knight	
Naomi Kuttner	clark brown architects
Rochelle Lamborn	Synergine Group Ltd
Jaret Lang	Manukau City Council
Marcus Langman	Auckland City Council
Paul Latif	CB Richard Ellis
Kenneth Lau	
Keith Laurie	Buller George Engineers
Alistair Law	Chapman Tripp
Katja Lietz	Waitakere City Council
Lisa Lindsay	LFC Floating Floor Specialist
Stuart Mackie	Chow: Hill Architects Ltd
Mario Madayag	Mario Madayag Architecture
John McArthur	The Laminex Group
Len McSaveney	New Zealand Concrete Society Inc.
Mark Milbourn	Stack
Jonathan Minnee	Unitec
Jo Monaghan	Warren and Mahoney
David Morgan	Stack
Fraser Morgan	University of Auckland
Thyra Nelson	creative spaces architects
Kate North	Matisse International
Gael Ogilvie	URS
Carey Oldfield	New Post Properties
Bruce Papp	Earthsafe
Jerome Partington	Jasmax
Naran Patel	Sinclair Knight Merz Ltd
Mark Perkins	Westfield NZ
David Philippe	Cavalier Bremworth Ltd
Neil Purdie	Connell Wagner Ltd
Roberta Queiroga	
Richard Robbins	Auckland International Airport Ltd
Tim Rutt	Pacific Coilcoaters
Ebrahim Sathar	United Group Ltd
Carolyn Savage	Du Bois & Sauvignon Ltd

Rosemary Scofield	HERA CSA
Peter Sewell	Waitakere City Council
Nicholas Simmons	Maccaferri NZ Ltd
Damian Simpson	Brownday Architects
Phil Smith	Hulena Architects
Charissa Snijders	Ethos Ltd
Jason Stuart	Matisse International
Peter Tayler	Rainbow Park Nurseries Ltd
Bob Taylor	Fire Protection Association NZ
Robin Taylor	The New Zealand Ecolabelling Trust
Ron Theaker	Energy Efficient Homes Ltd
Paul Thomsen	
Clare Thorne	Manukau City Council
Andrew Tipene	Direct Control
Chris Tobias	Consultant
Andrew Tu'inukuafe	Creative Spaces
David Turner	Unitec School of Architecture
Jason Tweedie	Onsight Energy Limited
Darren Utting	Synergine Group Ltd
Manu Vallyon	Vision Pacific
Allan Vernon	MWH-Consultants
James Ward	Direct Control Services
Karen Warman	Resene Paints Ltd
Bruce Warnock	Tasman Insulation NZ
Peter Weir	Ernslaw One & NZ Douglas-fir Association
Logan Whitelaw	Greenroofs for Sustainable Cities
Darren Willmoth	CBRE
Jonathan Woodbridge Buys	Property & Assets Group, Manukau City Council
Caroline Woodward	Matisse International

Total: 125

Rating Tools Workshop 1 – Christchurch

Mark Armitage	
Geoff Banks	Structex Ltd
Cory Bedford	Structex
Neville Bishell	Environment Canterbury
Donna Bridgman	URS (NZ) Limited
Kees Brinkman	Enercon Ltd
Ian Bywater	Engenius Solutions
Mark Cawston	Rapaki Property Group
David Clarkson	Resene Paints Limited
Michael Cole	Michaelangelo Design Studios Ltd
Ross Davidson	Shipston Davies Ltd
Russell Devlin	Solarchitect Ltd
Charlotte Donald	DTZ New Zealand
William Fulton	Stewart Ross Team Architecture
Stephen Graham	Inland Revenue
Matthew Gray	Powell Fenwick Consultants
Rochelle Hardy	Christchurch City Council
Christoph Hensch	
Richard Inglis	Christchurch City Council
Deirdre Johns	Downer Engineering

Sarah & Sven Johnston	
Dean Johnston	Spotless Services Energy Consulting
David Lees	URS CORP NZ
Anne Mackenzie	Build Green Ltd
Don Mackenzie	Lincoln University
Biais Marion	Chris Glasson landscape architect
Maurice Marquardt	Landcare Research
Michael Marshall	Courtney Architects : Designers Ltd
Ian McChesney	Private Consultant / Chair of Community Energy Action
John McDonagh	Lincoln University
Grant McPhail	Christchurch Polytechnic Institute of Technology
Brent Mettrick	Stonewood Homes Ltd
Jason Mill	pivnice ltd.
Mardi Neumann	YHA New Zealand
Martin Perry	Mirak Ltd
Jonathan Pooch	Enercon Ltd
Crispin Schurr	City Solutions
Martin Shaw	NZPVA & The Energy Initiative Ltd
Diane Shelander	
Brendan Smyth	Christchurch City Council, Strategy & Planning Group
Mike Stockwell	Christchurch City Council
Rhys Taylor	TNS-NZ and LCR and Sustainable Households
Rex Verity	CPIT (Chch Polytechnic Institute of Technology)
Brian Walker	Briab Walker Associates Ltd
Judy Waters	Ecan
Tony Wheal	Regis Design
Chrissie Williams	Sustainable Otautahi Christchurch
Arthur Williamson	Thermocell Ltd
Jessica Winter	Salmond Architecture / Sustainable Wanaka

Total: 50

Rating Tools Workshop 1 – Wellington

Andrew Alcorn	Victoria University of Wellington
Lynda Amitrano	BRANZ Ltd
Patrick Arnold	eCubed Building Workshop
Frank Baarspul	Propeller Limited
George Baird	Victoria University
John Baldwin	NZ Inst of Surveyors & School of Surveying, University of Otago
John Baldwin	Westpac
Mark Ballantyne	Tungsten Group
Alan Barbour	Beca
Craig Baxter	DTZ New Zealand
Peter Beaumont	Bell Kelly Beaumont Team Architecture
Claire Benge	Claire Benge Architect Ltd
Robert Binney	Capital Properties New Zealand Limited
Lisa Bridson	Housing New Zealand Corporation
Owen Brown	C4P Ltd
Ewan Brown	Hugh Tennent Architects
Allan Brown	Metallion Ltd
Malcolm Brown	Pacific Consultants

Nicola Byrne	Ambience and PAWA - Plants at Work Association
Alistair Cattanach	Dunning Thornton
Dan Coffey	EECA
Timothy Cope	Promanco Kenman
Tony Corry	Capital Properties New Zealand Limited
Alice Cuttance	Architecture +
Jordan Dallimore	LFC Flooring Wellington
Michael Davis	Studio of Pacific Architecture Ltd
Jared Dinneen	The Laminex Group
Skye Duncan	Athfield Architects
John Finnegan	Connell Mott MacDonald
Adriana Fontan	bbe architects
Sean Gledhill	Connell Mott MacDonald
Mark Goodliffe	Department of Corrections, Assets & Property
Shayne Gray	Meridian Energy Limited
Alexander Greig	Building Biology and Ecology Institute
Jane Henley	NZGBC
Alexandra Hills	Victoria University Wellington
Roger Hopkin	IPENZ
Stephen Kelly	URS NZ Ltd
David Kernohan	Department of Building and Housing
Kribashini Kisten-Reddy	Promanco Kenman
Justin Lees	Connell Mott MacDonald
Stuart Lyons	Promanco Kenman Ltd
Chris MacDonald	Matisse International
Guy Marriage	Studio Pacific Architecture
Patrick McGuire	Cement & Concrete Association of New Zealand
Callum McKenzie	McKenzie Higham Architecture
Jake McLaren	Formway Furniture
Georgia Myers	Jones Lang LaSalle
Kate North	Matisse International
Silvana Pedreschi	Aonui Architecture Ltd
Nicolas Perez	VUW
Dean Riddell	Davis Langdon
Murray Robertson	Stephenson&Turner
Andrew Robinson	Capital Properties New Zealand Limited
Mike Sammons	Consultant
Alistair Scott	Herriot + Melhuish: Architecture Ltd
Mohan Senanayake	Construction Marketing Services
Neil Shaw	Registered Master Builders Federation
Jono Smith	Victoria University
Hugh Tennent	Hugh Tennent Architects
Julia Vercoe	DTZ New Zealand
Nick Waddington	SKM

Michael Warwick
Bernard Weinstein
Chris Wood

Stephenson & Turner
Bernard Weinstein & Associates Ltd
Ministry for the Environment

Total: 65

Rating Tools Workshop 1

Auckland: 125

Christchurch: 50

Wellington: 65

Total: 240 People

Appendix E: Comments Received from First NZGBC Rating Tools Workshop, April 2006

Issues put forward for debate during workshop consultation and feedback comments made.

Management Systems, Plans and Procedures	
1	Independent verification of information supplied to assessment authority
2	Quality monitoring of contractors during construction
3	Monitoring of building control systems
4	Follow-up measures to ensure the building is running as planned
5	Information sources for continued efficiency of building systems supplied to building operations manager
6	Environmental management systems in place
7	Procedures to manage waste and recycling
8	Development of a maintenance and facility management plan
9	Development of a final environmental impact management plan
10	Ongoing review of all management plans and procedures
Workshop Feedback Comments on Management Systems, Plans and Procedures	
	<ul style="list-style-type: none"> • Guidelines for management plans should be provided and followed • Management criteria need to reflect the different stages of design, construction and operation • Incentives or credits can be offered for the establishment of management plans • Needs to be undertaken by trained and accredited professionals • Need measures in place to ensure that building is constructed and operates as planned • Systems to be as user friendly as possible • Verification manager to be part of client's design team • Give building rating an expiry date to ensure periodic review of the building
Environmental Quality within the Building	
1	Ventilation satisfaction: air freshness, air movement, draughts
2	Humidity control / mould protection
3	Carbon dioxide monitoring and control
4	Natural light levels, requirements and controls
5	Lighting requirements, levels and controls
6	External views
7	Temperature assessment and control
8	Asbestos minimisation / removal
9	Noise satisfaction: office noise, air/lighting noise, external noise
10	Air quality standards and measures

	Workshop Feedback Comments on Environmental Quality within the Building
	<ul style="list-style-type: none"> • Priority given to individual preference control • Social and technical aspects ought to be separated • Minimisation and removal of asbestos largely irrelevant as covered by legislation • Add indoor vegetation • Consider other irritants and pollutants such as emissions for carpets, laminates etc, and chemical issues, for example, off-gassing • Also consider ambience, odour, materials (toxicity, colour, texture), and space, particularly issues of colour and shape
Energy Efficiency	
1	Energy rating incorporated into design
2	Level of energy use
3	Electrical sub-metering for different tenants, uses and floors
4	Office lighting energy requirements
5	Presence of peak energy demand infrastructure
6	Renewable energy sourcing (type and quantity)
7	Passive heating and cooling design
8	Presence of a lighting control system
9	Potential for passive solar energy collection and storage
10	Consideration of alternative energy sources
Workshop Feedback Comments on Energy Efficiency	
	<ul style="list-style-type: none"> • Energy costs should reflect the true environmental cost long term • An energy rating is only of use if there are strong follow-up measures in place to ensure that the theoretical rating is achieved • Carbon emissions produced under building usage of energy • Natural ventilation • Heat recovery on ventilation systems • Optimising all HVAC systems also important • Importance of retrospective measuring: tool should measure actual energy use rather than estimated or design energy consumption / demand
Transport	
1	Reduce number of car parking spaces available
2	Provision of cyclist facilities
3	Integrated public transport systems in close proximity to building
4	Communication of public transport availability
5	Calculation of carbon dioxide emissions from transport
6	Increase number of 'small' car park spaces available
7	Policies to encourage the use of public transport
Workshop Feedback Comments on Transport	

	<ul style="list-style-type: none"> • Need for promotion and provision of carpooling • Need shower and change facilities for cyclists/runners • Development of wider-integrated citywide systems • Alternative fuel users and motorcyclists should have priority parking over conventional fuel users and larger vehicles • Reduce necessity of transport through better urban design (mixed use) • Integration of city planning with public transport systems • Need a <u>minimisation</u> of emissions from transport rather than a calculation • Provision for pedestrian traffic is missing • Efficiency and reliability of public transport needs to be addressed • Park and ride facilities • Flexible hours of operation • Public transport difficult to influence on project basis • Component of working at home • Offer incentives for distance cycled/walked • Emissions, energy and social responsibility involved with transport of materials to site • Encourage corporate transport plans
Water Efficiency	
1	Water meters installed for each tenancy and major user
2	Landscape irrigation water efficiency
3	Rainwater capture, storage and use
4	Water consumption by cooling or alternative systems
5	Fire system water consumption efficiency and management measures
6	Potable water efficiency monitoring
7	Evaporative cooling water loss
8	Metered stormwater reuse
9	Minimise volume of externally reticulated greywater
10	Area of impervious/semi-pervious/pervious surfaces to control stormwater run-off
Workshop Feedback Comments on Water Efficiency	
	<ul style="list-style-type: none"> • Priority should be potable water efficiency control to save drinking water for example through plumbing fixtures and fittings and water use design parameters/standards • Metered stormwater reuse would become the highest priority if credit system is in place • Water quality issue is missing • Education on water efficiency • Points for compost toilets and water-free urinals • Standards set for potable water usage; incentives for reduction • Require a water efficiency management plan • Tank location to minimise pumping cost/losses

	<ul style="list-style-type: none"> • Maximise reuse of greywater • Water conservation fittings
Materials	
1	Allocation of space for recycling and waste storage
2	Re-use/recycling of building structure and materials
3	Provisions for shell, core or integrated fit-out
4	Reduction in PVC usage
5	Use of sustainable timber
6	Reduction of materials or components that rely on scarce or non-local resources
7	Selection of durable materials
8	Use of recycled materials
9	Life span and reliability of components
10	Information on hazardous materials available to staff
Workshop Feedback Comments on Materials	
	<ul style="list-style-type: none"> • Full life-cycle analysis is missing • Very important to source materials with low embodied energy • Recognise alternative fuels in manufacture for example bio-fuels in cement production • Use of hazardous materials • Mass of materials should be taken into account • Consider manufacturers environmental management system • Reduction of petroleum based materials • More objective measures of the environmental consequences of particular materials is needed • Consideration of colour and texture of materials • Assessment of quality of recyclable material • Environmental choice rating materials for example paint, carpet, flooring • End of life: furniture, fit-out, waste, building fabric recyclability and reusability • Effectiveness of future proofing • If concrete is used CO₂ emissions are an issue
Land Use and Ecology	
1	Consideration of consecutive land uses in the planning process
2	Synergy with neighbouring land uses in planning / design stages
3	On-site cut and fill balance
4	Type and size of landscape areas
5	Percentage cover of native plants
6	Complexity index to measure relative areas of lawn, shrubs and trees
7	Measures to minimise construction damage to surface ecology

8	Measures to minimise impacts on subsurface ecology and aquifers
9	Consideration of the ecological value of the site during and after development
10	Use of marginal land ie, previously built on/industrial use
Workshop Feedback Comments on Land Use and Ecology	
	<ul style="list-style-type: none"> • Planting of appropriate plants • Penalties and incentives for environmental procedures for example minimise removal of topsoil etc • Some other natural factors are missing such as wind/air movement • Ecology and natural systems can be seen as 'global' planning tools that guide other categories • Integration of the project with city plan and process as an overall plan • Effects on the surrounding area for example, wind tunnels, light pollution ie, bounce off glass, heat radiation • Land use to provide a renewable energy source • Rooftop gardens very important • Reference to contaminated land • Archaeological/cultural/historical value • Must have social impact assessment as part of rating system
Emissions, Effluent and Pollution	
1	Measurement and reduction of ozone depleting potential and gGlobal warming potential in cooling and insulation design
2	Presence of refrigerant leak detection equipment
3	Refrigerant recovery
4	Treatment or filtration of stormwater to above building code requirements
5	Reduced flow to sewer
6	Requirement that no cooling towers service the building
7	Toxicity and quantity of waste produced during construction and operations
8	Presence of pollutants: general, organic, toxic
9	Reduction in activities such as fertiliser use, herbicide / pesticide use, car washing, cleaning chemicals present
10	Storage and handling of toxics
11	Disposal methods for toxics and other waste
Workshop Feedback Comments on Emissions, Effluent and Pollution	
	<ul style="list-style-type: none"> • Energy sources of building • Credits for designing out emissions as much as possible • Numbers 2 and 3 are outdated as few refrigerant systems now use ozone depletion potential • On site rainwater capture and sustainable urban drainage systems • Greywater and stormwater usage • Light and noise pollution to be considered • NOx/SOx emissions if gas boilers are in place • Consider pollutants emitted during manufacture of materials

	<ul style="list-style-type: none"> Noise pollution (construction issue) Plants remove volatile organic compounds, and should be included in new and existing buildings
Quality, Service and Risk	
1	Incorporation of tenant requirements and functionality into design and planning procedures
2	Earthquake-resistance measures incorporated into design
3	Increased service life of components and increased reliability
Workshop Feedback Comments on Quality, Service and Risk	
	<ul style="list-style-type: none"> User feedback essential. As user satisfaction increases so does productivity Urban quality of life impact sustainability Consider health and safety aspects such as Sitesafe construction
Flexibility and Adaptability	
1	Increased capacity of floor space to allow for flexibility and growth
2	Facilities to allow for changes in occupant requirements and growth
3	Consideration of hours of occupancy
4	Facilities to allow for changes in number of occupants
5	Review of floor-to-floor height for flexibility to accommodate future uses
6	Flexibility to accommodate future uses
Workshop Feedback Comments on Flexibility and Adaptability	
	<ul style="list-style-type: none"> Building infrastructure can allow for future growth while having a negative impact on the current users Flexibility of design needed. For example, new tenant can move partitions etc rather than refitting Encourage relationship between developer and tenant to create an 'holistic' solution to initial building/fitout while thinking of future users Modular / flexible designs Consideration of hours of occupancy and zoning

Appendix F: Invitation and Outline for Second NZGBC Workshop



Green Building Rating Tools for NZ

The New Zealand Green Building Council presents Stage 2 of the Sustainable Building Assessment Scheme Project.

- Be informed about the future of Green Building in NZ
- Stay updated on the direction of Sustainable Building Assessment systems for NZ
- Be part of decision making for a Rating Tool
- Ensure your company understands the opportunities for the future

Workshops that were held around the country in April have supplied useful data that has been used to help define the direction forward for NZ. An Industry Consultation group has assisted New Zealand Green Building Council to discuss and consider solutions for New Zealand. This presentation will walk you through the background of the project and outline the possibilities for a way forward. An Industry Consultation Panel will contribute their views and expertise to the session.

EVENT FORMAT

A presentation will overview the New Zealand Green Building Council followed by detailed overview of the Project's Progress and discussion by experts.

Auckland	Tuesday 20 June	6.00 - 7:30pm	Auckland Town Hall
Wellington	Wednesday 21 June	5.00 - 6:30pm	Westpac Stadium
Christchurch	Friday 23 June	12.30 - 1.30pm	Venue TBC
Dunedin	Thursday 22 June	4.00 - 7.00pm	Venue TBC

Please register on-line today. Venue details will be sent upon registration.
<http://www.nzgbc.org.nz/event/registration>

Appendix G: Second NZGBC Workshop Attendees List

Registrations for Series 2 – Auckland

Brendan Alexander	Auckland City
Robin Allison	Cohousing New Zealand Ltd
Russell Baillie	EECA
Kim Bannon	Jones Lang LaSalle
Simon Barnes	Davis Langdon
Leanne Beard	Soul Limited
Jon Begg	Habitat Carpentry
Allanah Berry	URS
Tina Bishop	URS
Peter Bowerman	IRHACE
Hans Buwalda	Fletcher Building Ltd
Claire Cameron	Fifth year student
John Cameron	GHD Limited
Robert Campion	Architectural Profiles Ltd
William Carter	Generation Developments Ltd
Allan Catterall	Interface New Zealand Ltd
Gary Caulfield	MPM Projects
Chilin Cheng	Taiwan Green Building Council
Stephen Chu	Stephen Chu Architects
Barbara Cooper	Thermobuild Homes
Andrew Cordes	Ecco Pacific
Alec Couchman	Warren and Mahoney
Hamish Craigie	Connell Wagner
Bernie Crowe	TelstraClear
Peter Cunningham	Sinclair Knight Merz
Hamish Davies	Avery Team Architecture
Jared Dinneen	The Laminex Group
Stephen Drake	Auckland City Council
Brendon Dwyer	Beca
Lois Easton	Beacon Pathway Limited
Phil Eaton	Multiplex
Paul Edmond	Construkt Architects
Grant Ewen	Rider Hunt
Tim Farman	Cupolex
Blair Farquhar	Wingate + Farquhar
Jamie Fear	Construction Marketing Services
Michael Field	URS New Zealand / New Zealand Green Building Council
Duncan Firth	Poweredliving Auckland
Michael Fisher	CPRW Fisher Ltd
David Foster	ADC Architects
Anne Foy	Waitakere City Council
Lincoln Fraser	Newcrest Group
Roger French	

Glenda Fryer	Auckland City
Sharron Furniss	Inscape
Richard Furniss	Inscape
John Gilbert	Kada
Deborah Godinet	Auckland City Council
Kevin Golding	Winstone Wallboards Ltd
Jude Green	Style Plantation, Renewable Resources
Martin Greenough	Tasman Insulation New Zealand
Dean Griffin	Lighting Council New Zealand
Jon Haag	Structure Design Ltd
Nigel Hailstone	
Alison Hall	North Shore City Council
Grant Hansen	Thermobuild Homes
Tristan Harvey-Smith	ADC Architects
James Hassall	Phillips Fox
Ben Hayes	RTA Studio
John Heap	SKM
Ewen Henderson	Darby Partners
Jane Henley	New Zealand Green Building Council
Ivy Heung	Manukau City Council
Wayne Hillhouse	Ecco Pacific Australia
Stephen Hobbs	South Pacific Waterless Ltd
Hamish Holder	Eco Insulation
Nat Holloway	Arhaus Group
Tim Hooson	JASMAX
Roman Jaques	BRANZ Ltd
Pritesh Jayswal	Auckland University
Paul Jones	ECO-Block New Zealand Ltd
Wendy Jones	Fonterra
Peter Joyce	Waitakere City Council
Margaret Julian	Arhitects
Paul Jurasovich	JASMAX
Frans Kamermans	Kamermans & Co Architects Ltd
Brenda Kim	Shanahan Architects
Bryan King	Lighting Council New Zealand
Joanna Kolakowska	
Kin Yong Kong	
Naomi Kuttner	Clark Brown Architects
John Lambert	Lee Lambert Architecture Ltd
Rick Lambourne	Lambourne Architects
Jaret Lang	Manukau City Council
Marcus Langman	Auckland City Council
Dawood Latif	3E Energy Ltd
Agatha Lee Lambert	Lee Lambert Architecture Ltd
Ross Legh	Norman Disney & Young
Howard Mackley	Ecco Pacific
Daryl Maguire	Chow:Hill
Justin March	Phillips Fox
Christopher Mason	NZIA
Les Matthews	MSM Architects (Hamilton)
Len Mauer	LFC Floating Floor Specialists

Wendy Mauer	LFC Floating Floor Specialists
John McArthur	The Laminex Group
Trudi McKeown	RE/MAX (Commercial & Industrial Real Estate)
Len McSaveney	New Zealand Concrete Society Inc.
Michael Middlebrook	JASMAX Architects
Christine Mitchell	Auckland Regional Council
Laura Monzon	
Prashant Mulay	Health & Harmony
Alan Muller	Carson Group
Graham Neal	NDY
Thyra Nelson	Creative Spaces
Jim North	encompass intl.
Kate North	Matisse International
Bernard O'Neill	Rider Hunt Terotech
Graham Osmer	Multiplex Constructions (NZ) Ltd
Maria Ouzounova	WMZ Architects Ltd
Naran Patel	Sinclair Knight Merz Ltd
Mark Perkins	Westfield
David Philippe	Cavalier Bremworth Ltd
Brett Plummer	Manukau City Council
Bryan Pooley	NZIA
Davor Popadich	Architects Patterson Ltd
James Powell	Sinclair Knight Merz
Bob Price	Madrens Timber
Roberta Queiroga	Waitakere Architects
Richard Robbins	Sustainable Business Network
Aaron Ross	Ecco Pacific
Clark Ross Gordon	Seagar and Partners/ Private
Tony Sainsbury	Auckland City Council
Rosemary Scofield	HERA
Nicholas Simmons	Maccaferri NZ Ltd
Kirsty-Anne Singleton	Phillips Fox
Philip Smith	Hulena Architects
Toni Smith	Resene Paints Ltd
Robin Taylor	Environmental Choice New Zealand
Rosangela Tenorio	University of Auckland
Ron Theaker	Energy Efficient Homes Ltd
Michael Thomson	Architectus
Chris Tobias	Consultant
Fiona Towers	Auckland City Council
Jack Turner	Works Infrastructure
Allan Vernon	MWH Consultants
Kirsty Verrill	Sanford Limited
Peter Walker	Auckland City Council
Claire Walker	Boffa Miskell
Jessica Ward	Darby Partners
Brian Wemyss	Plastics New Zealand
Logan Whitelaw	Greenroofs for Sustainable Cities
Geoff Wicks	Multiplex Constructions (NZ) Ltd
Darren Willmoth	CB Richard Ellis
Nick Wilson	Phillips Fox

Tony Winter	Dwell
Jason Wong	Mainzeal Property and Construction Limited
Jonathan Woodbridge Buys	Manukau City Council
James Young	Crosson Clarke Carnachan Architects

Total: 149

Registrations Series 2 – Christchurch

Martin Barrett	Christchurch City Council
Paul Barry	Paul Barry Architect
Cory Bedford	Structex
Neville Bishell	Environment Canterbury
Ket Bradshaw	Plastics NZ
Donna Bridgman	URS Corp NZ
Mark Cawston	Rapaki Property Group Ltd
Michael Cole	Michaelangelo Design Studios Ltd
Gordon Dalkie	OPUS Architecture
Ross Davidson	Shipston Davies Ltd
Russell Devlin	Solarchitect Ltd
Charlotte Donald	DTZ New Zealand Ltd
Monique Fouwler	Opus International Consultants Ltd
William Fulton	Stewart Ross Team Architecture
Matthew Gardner	URS
Lindsay Hampton	University of Canterbury
Richard Hayman	Dalman Architecture
Jane Henley	New Zealand Green Building Council
Geoff Holgate	DTZ New Zealand Limited
Leonid Itskovich	Christchurch City Council
Deirdre Johns	Downer Engineering
Dean Johnston	Spotless Services NZ Ltd
David Lees	URS Corp NZ
Don Mackenzie	Lincoln University
Craig Mangos	Iplex Pipelines
Mike Marshall	Courtney Architects
John McDonagh	Lincoln University - Property Group
Ian McKenzie	Christchurch City Council
Ross Megget	Ross Megget Architects
Marc Mendonca	Fletcher Construction
Peter Molony	University of Canterbury
Richard Munt	Opus International Consultants (Property Services Group - Christchurch)
Mardi Neumann	YHA New Zealand
Martin Perry	Mirak Ltd
Jonathan Pooch	Enercon Ltd
Craig Price	Beca Carter Hollings & Ferner Ltd
Liz Rivers	URS
Crispin Schurr	City Solutions
Diane Shelander	
Brendan Smyth	Christchurch City Council, Strategy & Planning Group
Daniel Squires	EcoArk Ltd
Simon Taylor	Connell Wagner

Rhys Taylor	Sustainable Living Programme (also with LCR and TNS-NZ)
Brian Walker	Brian Walker Associates Ltd
Peter Weir	Ernslaw One & NZ Douglas-fir Association
Paul Wilkins	Phoenix Architects Ltd
Arthur Williamson	Thermocell Ltd
Chris Wood	Ministry for the Environment

Total: 48

Registrations Series 2 – Dunedin

Total 17

Ian Buchan	Power Options NZ Ltd
Ian Butcher	
Fliss Butcher	Dunedin City Council
Phil De La Mare	Ernslaw One Ltd
Ralph Henderson	Dunedin City Council
Jane Henley	New Zealand Green Building Council
Nicholas Karlovsky	Dunedin City Council
Ian Macdiarmid	Macdiarmid Building Design Ltd
John McCoy	McCoy and Wixon Architects
Chris Murphy	McCoy + Wixon Architects
Colin Pickering	Building Control DCC
Amanda Riach	Dunedin City Council
Anne Salmond	Salmond Architecture Ltd
Bryan Scott	
Ian Stephenson	Beca
Geraldine Tait	Waikouaiti Coast Community Board
Jonathan Watts	Beachmount Developments Ltd

Total: 17

Registrations Series 2 – Wellington

Total 114

Elinor Guy	Design Club
Tom Adson	New Zealand Defence Force
Andrew Alcorn	School of Architecture, Victoria University
Lynda Amitrano	BRANZ Ltd
Rob Ansell	SKM
Tim Armstrong	East Harbour Management Services
Patrick Arnold	eCubed Building Workshop
Julian Ashby	Housing New Zealand
George Baird	Victoria University of Wellington
John Baldwin	Westpac
Mark Ballantyne	Tungsten Group
Alan Barbour	Beca
Peter Beaumont	Bell Kelly Beaumont Team Architecture Ltd
Michael Bennington-Barr	Aonui Architecture Ltd
Andrew Bluck	Comeskey Grant Architects
Nicola Bradshaw	Sustainable Future
Tim Burns	Pynenburg and Collins Architects Ltd
Nigel Cartmell	Jestico+Whiles Architects (London, UK)

Nigel Case	Parsonson Architects
Alistair Cattanach	Dunning Thornton Consultants + ACENZ
Chris Chan	Kensington Swan
David Chittenden	Ministry for the Environment
Alfred Chung	URS New Zealand Ltd
Tim Cope	Promanco Kenman Ltd
Ashley Cornor	Phillips Fox Lawyers
Brighid Critchlow	BBE Architects Nelson
Jane Cuming	PlaceMakers
Alice Cuttance	Architecture +
Jordan Dallimore	LFC Flooring Wellington
Peter Davis	Sustainable Aotearoa New Zealand / Green Party
John Eyre	Ministry of Agriculture and Forestry
James Fenton	Architecture Workshop
Anna Fenton	Phillips Fox Lawyers
James Firestone	New Zealand Fire Service
Mike Frew	ASCA Trust
John Gallagher	Anax
Charlotte Goguel	John Mills Architects Ltd
Isobelle Gosling	EECA
John Hale	Fletcher Construction
Veronica Hale	Taylor Architects Ltd
Wendy Harding	BRANZ
John Hardwick-Smith	Athfield Architects Ltd
Roger Hay	Policy Advocate - Building Codes
Michelle Hayward	Greater Wellington Regional Council
Jane Henley	New Zealand Green Building Council
Susan Hesp	Phillips Fox Lawyers
Jerry Hewitt	Sinclair Knight Merz Ltd
Alexandra Hills	Victoria University Wellington
Patrick Homan	New Zealand Post Properties
Roger Hopkins	IPENZ (and Victoria University of Wellington)
Nigel Isaacs	BRANZ Ltd
Quentin Jackson	e Cubed Building Workshop
Paul James	Sinclair Knight Merz
Don Jamieson	Don Jamieson Architecture
Daryn Jemmett	Accident Compensation Corporation
Stephen Kelly	URS NZ LTD
Nikki Kirk	BRANZ
Jaime Lawrence	Athfield Architects
Niki Lawrence	Creative Spaces
Justin Lees	Connell Wagner
John Le Harivel	Housing New Zealand Corporation
Shane Litzenberger	URS
Rod Macdiarmid	Pelorus Architecture Ltd
Chris MacDonald	Matisse
David Mann	Promanco Kenman Ltd
Mark Marinovich	John Mills Architects Ltd
Guy Marriage	Studio Pacific Architecture
Darren Matthews	
Tim Matthews	Phillips Fox Lawyers

Patrick McGuire	Cement & Concrete Association of NZ
Jake McLarern	Formway Furniture
John Mills	John Mills Architects Ltd
Idris Minke	CSINZ.COM Ltd
Richard Morrison	
Nick Mouat	Athfield Architects
Esme Mulligan	
Rob Patience	Fletcher Construction
Maibritt Pedersen Zari	School of Architecture, Victoria University
Silvana Pedreschi	Andrew Sexton Architecture Ltd
Luke Perry	Aonui Architecture
John Pfahlert	Building Industry Federation
Murray Pugh	Acuity Partners
Carl Rankin	ECANZ
Emily Reich	John Mills Architects Ltd
George Riddell	Business New Zealand
Dean Riddell	Davis Langdon
Mary Roberts	Energy and Technical Services Ltd
Colin Russell	Athfield Architects
John Russell	Environs Design Group
Stephen Sargent	Green Room Architects Ltd
James Saunders	Vorstermans Architect
Alistair Scott	Herriot + Melhuish Architecture Ltd
Simon Shaw	Arrow International Ltd
Neil Shaw	Registered Master Builders Federation
Ian Shearer	Energy Information Services Ltd & NZ Photovoltaic Assn
Sharon Skinner	Phillips Fox Lawyers
Jono Smith	Victoria University
Kevin Stacey	New Zealand Fire Service
Albrecht Stoecklein	BRANZ Ltd
Caroline Strachan	Assn Consulting Engineers NZ (ACENZ)
Ben Thompson	Kapiti Coast District Council
Shaun Thompson-Gray	Hunt Davies Tennent Limited
Lucy Ullrich	HNZC
Martin Venter	Energy and Technical Services
Celia Wade-Brown	Wellington City Council
Nick Ward	
James Warren	John Mills Architects Ltd
Michael Warwick	Stephenson&Turner
Chris Watson	C Watson Consultancy Ltd
Bernard Weinstein	Bernard Weinstein & Associates Ltd
Miriam White	Sustainable Future
William Woods	NZ Defence Force
Nicola Yortt	Halstead Flooring Concepts Ltd
Total: 114	

Appendix H: Summary of Outcomes from Second NZGBC Workshop, June 2006

SUMMARY OF GREEN BUILDINGS RATING SCHEME PRESENTATIONS

Auckland, 20 June 2006

Wellington, 21 June 2006

Dunedin, 22 June 2006

Christchurch, 23 June 2006

26 June 2006

Presented by: Jane Henley, Establishment CEO and Rachel Hargreaves, BRANZ Ltd.

Overview of NZGBC

The aim of the New Zealand Green Building Council is to: transform New Zealand's building and construction industry by providing market driven solutions to improve environmental performance buildings and reduce the impact of development.

Features of the NZGBC:

- Facilitate the process with multiple stakeholders with a non-prescriptive focus, and to share the knowledge amongst the wider building and construction industry.
- It's a non-profit-organisation. It aims to be a World Green Building Council member by the end of 2006.
- Full board will be appointed by the end of next week.
- Membership-based from the start of July – membership is expected to range from \$300-\$15,000.
- Industry-led and market driven.
- Sponsors include (amongst others): Dow, Gib, Beacon Pathways Ltd, Massey University, the Defence Force, the Sustainable Business Network, and Jasmax.
- Functions and processes of the Council are transparent and accountable.
- Produce a commercially viable rating tool (for office buildings) by the end of 2006.
- Position in marketplace: concentrates on the top 25% of buildings – not for your average barely code-compliant box.

Benefits of developing a rating tool framework:

- All members have access to a standard tool.
- Managed and owned by a credible and independent third party.
- Process to help achieve best practice.
- Speed up the transition for occupiers, design and build, developers and investors to specify/want green buildings.

NB: All tools will be designed to work together and compliment one another. The Council are working in partnership with HERS and EECA, BRANZ and Beacon Pathway.

Overview of the Rating Tool Research Project (funded by Ministry for the Environment)

Project aims:

The aim of this project was to present a solution for the development of a sustainable building assessment system for New Zealand. The solution will be consistent with tools across the Tasman (and thus use the Greenstar tool as a base / starting framework).

The solution focuses on:

- creating market drivers
- the performance of the building, including the existing building stock
- creating a user friendly interface.

The proposed solution for New Zealand includes four key elements:

- The Design Phase tool is to rate the sustainability of building before construction. It ensures that impacts are considered at the design stage of building development, and assesses the sustainability of a new design. Major retrofits are included.
- The Built Phase tool validates the design was built in accordance with specifications so that contractors are unable to do detrimental shortcuts that affect the performance of the building, for example, and make the designer's work less effective than it otherwise may have been.
- A Performance tool would be done after a period of time (eg, two years) after the building is built. This would be the building's final rating and it rates the building's actual performance in real conditions after the fine-tuning period post-construction. This could be valid for five years.
- An existing building tool applies to any buildings over two years old that did not go through the other rating tools, or after the five year certification period on buildings that did go through the other rating tools. This can be done as a whole building or by a tenancy basis so apartment dwellers, for example, can have their apartment rated without fear of wasteful neighbours bringing down their own rating. This is hoped to be a driver for retrofit so that buildings can re-enter the rating process.

The layout of the tools as it is planned is flexible and receptive to new/additional tools. Broad types of buildings are covered, and the rating scheme can be used to track the performance of a building over time.

Current plans for tool development:

Tool 1: Design and Build Assessment

Tool 2: Performance Assessment

Tool 3: Existing Building Assessment

Key points from the regional sessions:

- We fielded a number of queries relating to the scope of the proposed solution and whether or not broader issues such as urban design, industrial ecology, multiple-site stormwater management issues would be taken into account.
Answer: While some of the categories / credits in the proposed tool apply to land use and ecology issues, the capacity to go beyond the immediate footprint of the building is limited. However, it is recognised that the current paradigm that rating tools exist in has its limitations. The idea of a new generation of tools that look at wider sustainability issues needs to be continually considered as the NZGBC evolves.
- We fielded many queries about the relationship between the NZGBC solution and the role of the building code (and to a lesser extent – where tools such as TUSC fit in).
Answer: the Building Code covers ‘minimum compliance’ with building sustainability issues – whereas the NZGBC solution is positioned at the ‘top’ end of the market (clarification: ‘top’ does not mean the most expensive, but the most innovative). Over time, it is hoped that the drive towards best practice (aspirational goal) will pull the building code minimum standards (regulatory bottom line) along with it (thus the bar is continually raised).
- Ongoing concerns that the NZGBC solution is too ‘soft’ – many sustainability architects have been doing this for years and now will ‘have to prove’ that they are sustainable (by fitting the mould).
Answer: Rating tools are just one ‘expression’ of what makes a building sustainable. Categories and credits will ‘ramp up’ over time and as the rating tool paradigm evolves.
- What if sprinklers were installed into a building that did not necessarily require them? Would they be given points for the reduction in greenhouse gas emissions and pollution that may be prevented in the lifetime of the building in case of fire?
Answer: The fine definitions have yet to be worked out, however this is likely to fall under the “Innovation” category of the rating tool where consideration is given to innovative ideas when making the rating.
- Is it available for DIYers to use?
Answer: Yes, but for certification you have to go through professionals.
- What if a building receives a lower rating than what the architect designed it for due to contractors substituting inferior materials to reduce costs for the developers, for example?
Answer: Due to the differing certification stages, each certificate stands even if a consequent rating is lower than expected. This means that designers are still able to take all credit due for their original design and are not persecuted for the actions of others.

Summary of other areas of discussion:

- It is important for a robust framework to be developed first, from which the rating tools evolve from – rather than the other way around.
- There was a question surrounding whether the value of non-green-rated buildings will fall. This is why we are looking to have a tool that addresses the existing building stock to lessen the potential gap that will develop between new and existing building performance.
- Dealing with embodied energy in rating tools: difficult to achieve and remain non-discriminatory. A key aspect of the success of the tools is to NOT discriminate materials using embodied energy results – rather promote ‘best’ choice via the sustainability performance (or otherwise) of the manufacturer.

- Implementation issues: Many questions reflected a strong interest in implementation issues, for example policing and certification.
- There was a question raised about the use of building information models (BIM). Apparently use of international rating tools is driving uptake of BIM into green building design. This will be one for the tool design / technical working group to resolve!

In each centre there were also panel discussions that were made up of members of the Project Consultation Group:

- Michael Field – URS NZ Ltd
- Wayne Sharman – Building Research
- Marko den Breems – Jasmax
- Chris Wood – Ministry for the Environment
- Geoff Banks – (ACENZ) Structex
- Justin Lees – Connell Mott
- David Kernohan – Department of Building and Housing
- Jason Happy – Kiwi Income Property Trust
- Hans Buwalda – Fletcher Building
- Chris Mason – New Zealand Institute of Architects
- Mark Sigglekow – Pragmatix
- Graeme Finlay – Warren & Mahoney

Appendix I: Results from Rating Tools Workshop 1

Table 3-1: Results from ranking exercise, Auckland Christchurch and Wellington workshops

Issue	Ranking - AKL														Total	#	Ranking	Ranking - CHC										Total	#	Ranking	Ranking - WEL										Total	#	Ranking	Custord	Custord
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12	Group 13	Group 14				Group 15	Group 16	Group 17	Group 18	Group 19	Group 20	Group 21	Group 22	Group 23	Group 24				Group 25	Group 26	Group 27	Group 28											
1	3	3	3	10	4	1	10	1	1	2	9	10	4	6	3	10	1	10	10	8	1	42	3	3	1	8	10	10	1	1	32	7	135	5											
2	7	5	5	3	3	3	8	10	6	6	10	5	6	8	3	6	3	5	8	8	1	39	8	10	3	1	5	7	2	8	3	26	6	154	8										
3	8	7	7	4	8	10	3	4	7	8	6	8	8	8	4	8	7	2	5	5	31	5	8	5	7	6	3	1	4	35	8	155	3												
4	3	3	8	3	5	2	1	5	2	10	2	3	3	14	5	7	8	3	2	4	2	23	2	7	4	3	4	3	3	4	21	3	124	4											
5	10	8	3	8	7	3	4	2	5	9	1	2	7	81	7	6	5	5	7	4	3	30	4	6	10	6	3	8	6	10	5	39	10	150	6										
6	1	2	2	2	2	4	2	8	3	1	3	1	2	33	1	3	3	2	8	9	1	32	6	5	5	2	3	1	5	1	16	1	81	1											
7	5	4	4	6	10	8	6	7	3	4	5	7	3	76	6	6	10	10	4	7	6	45	10	3	3	4	7	6	5	5	2	35	8	158	10										
8	2	6	6	5	3	7	5	6	10	5	6	3	5	63	4	2	2	6	6	11	2	19	11	1	5	5	2	5	5	8	2	106	3												
9	4	1	1	1	1	5	3	3	7	3	4	8	1	48	2	1	3	3	1	6	3	23	2	2	8	10	1	4	5	6	1	25	4	102	2										
10	6	10	10	7	6	6	7	4	8	8	7	4	10	93	10	7	4	4	3	3	7	4	34	7	4	2	3	8	2	4	152	7													
Sum	55	55	55	55	55	55	55	55	55	55	55	55	55	715	54	55	55	55	55	55	55	330	54	55	52	55	55	55	41	54	16	272	53	1311	55										
Issue	Ranking - AKL														Total	#	Ranking	Ranking - CHC										Total	#	Ranking	Ranking - WEL										Total	#	Ranking	Custord	Custord
1	2	2	4	1	1	2	1	1	3	1	3	1	3	25				1	6	1	1	1	2	1	12	1	3				1	1	5	1	2	3	6	22	2	53					
2	8	4	5	5	5	4	7	7	8	7	8	6	6	74	7	4	8	3	7	3	8	7	45	8	8	3	8	7	8	8	3	65	3	184	7										
3	3	5	7	7	3	8	3	3	4	8	10	3	4	38	3	3	7	8	subset of	8	3	44	7	5	1	8	3	7	3	3	3	56	8	198	8										
4	3	6	2	2	4	7	2	3	6	3	6	2	5	51	2	2	2	4	2	4	5	22	3	2	3	1	7	3	3	2	2	23	3	96	3										
5	5	7	8	6	8	5	3	8	7	4	4	7	4	72	6	3	4	5	5	6	6	26	5	2	5	4	2	6	7	3	35	5	133	6											
6	10	3	3	8	7	3	8	6	10	3	3	4	10	102	10	7	10	7	3	6	7	46	3	3	6	7	6	3	6	7	53	7	201	3											
7	4	3	3	4	3	3	3	6	2	5	2	7	5	53	4	5	3	2	3	1	4	19	2	7	7	1	4	4	4	4	35	5	107	4											
8	1	10	10	3	10	10	10	1	10	1	10	1	10	1	33	8	10	3	10	code	10	10	10	10	10	10	10	10	10	10	10	220	10												
9	6	8	6	3	6	6	4	5	3	5	5	3	3	66	5	8	5	6	4	5	7	3	34	6	1	4	5	3	2	5	5	30	4	130	5										
10	7	1	1	10	2	1	5	4	2	6	2	8	2	51	2	1	6	3	subset of	3	2	8	23	4	1	2	6	1	5	1	1	18	1	32	2										
Sum	55	55	55	55	55	55	55	55	55	55	55	55	55	25	685	54	55	55	55	55	55	330	55	46	47	48	55	54	51	55	55	405	54	1420	55										
Issue	Ranking - AKL														Total	#	Ranking	Ranking - CHC										Total	#	Ranking	Ranking - WEL										Total	#	Ranking	Custord	Custord
1	4	1	2	1	1	6	2	10	1	1	2	4	2	37				2	5	2	1	1	1	2	6	18	2				1	1	2	1	1	5	11	2	56	2					
2	1	6	1	3	2	1	1	1	4	2	1	1	1	31	1	1	1	2	2	2	1	5	14	1	2	2	1	2	1	1	10	1	55	1											
3	10	8	7	10	3	8	10	3	6	6	5	10	10	107	10	10	6	8	4	5	7	9	49	7	6	6	10	10	4	8	4	44	8	200	10										
4	7	10	5	7	3	3	6	7	7	5	4	3	7	92	7	3	4	10	5	7	5	7	46	6	4	3	3	7	8	4	6	3	37	5	175	7									
5	3	7	3	8	6	10	3	8	3	4	10	8	3	100	3	7	8	3	6	8	3	10	51	10	5	10	10	3	7	4	10	6	47	10	198	3									
6	5	5	4	5	7	5	4	2	3	7	5	3	53	4	4	10	6	3	3	3	8	3	49	7	3	8	7	3	4	4	2	29	4	137	4										
7	2	2	6	2	3	2	5	1	3	2	6	4	1	41	3	2	3	4	3	3	3	1	19	3	3	5	3	4	4	1	5	3	24	3	84	3									
8	8	3	8	3	10	7	7	6	8	7	8	7	8	36	8	3	5	3	1	6	6	8	50	3	7	4	5	8	3	5	7	7	42	7	188	8									
9	3	3	3	4	4	3	3	10	1	3	3	5	65	6	6	7	7	8	10	4	2	44	4	10	7	8	5	5	3	9	10	46	3	155	6										
10	6	4	10	6	5	4	3	5	3	2	6	6	4	64	5	3	3	5	10	4	10	4	45	5	8	3	3	6	6	5	3	8	40	6	149	5									
Sum	55	55	55	55	55	55	55	55	55	55	55	55	55	692	55	55	55	55	55	55	55	385	54	55	55	54	55	55	55	55	330	55	1407	55											
Issue	Ranking - AKL														Total	#	Ranking	Ranking - CHC										Total	#	Ranking	Ranking - WEL										Total	#	Ranking	Custord	Custord
1	4	7	2	6	4	4	4	3	6	5	3	3	5	4				60	5	4	3	5	3	5	30	4	2				5	5	3	4	5	4	5	28	3	118					
2	4	3	4	3	5	5	4	3	2	4	4	4	4	3	48	3	2	2	1	4	2	3	3	17	2	3	4	4	4	3	4	3	7	28	3	93	3								
3	3	1	1	3	1	2	2	1	1	1	2	1	1	1	21	1	3	1	2	2	1	1	11	1	1	1	1	1	1	1	1	2	8	1	40	1									
4	2	3	7	2	5	3	3	5	5	3	5	5	3	5	56	4	5	5	4	6	4	6	34	5	7	7	2	7	5	3	5	3	37	5	127	5									
5	6	6	5	6	6	7	6	4	7	1	6	6	6	72	6	1	7	7	6	7	6	7	42	7	6	3	7	6	7	6	4	39	6	153	6										
6	5	5	5	7	7	7	6	7	7	6	6	7	7	84	7	7	6	6	5	7	6	4	41	6	5	6	7	5	6	6	7	6	41	7	166	7									
7	1	2	4	1	2	1	1	2	2	4	7	2	2	2	33	2	6	4	3	1	3	2	21	3	4	2	3	2	2	2	2	1	15	2	63	2									
Sum	10	28	28	28	28	28	28	28	28	28	28	28	28	28	974	28	28	28	28	28	28	28	136	28	28	28	28	28	28	28	28	196	28	766	28										

Results from Ranking Exercise, Auckland, Christchurch and Wellington Workshops

Issue	Ranking - AKL												Total	Overall Ranking	Ranking - CHC										Total	Overall Ranking	Ranking - WEL										Total	Overall Ranking	Continued	Continued Rank
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12			Group 13	Group 14	Group 15	Group 16	Group 17	Group 18	Group 19	Group 20	Group 21	Group 22			Group 23	Group 24	Group 25	Group 26	Group 27	Group 28								
1	6	5	2	3	7	6	2	6	4	3	5	2	51	3	1	1	2	1	3	6	3	23	2	1	5	2	1	5	4	7	25	2	33	2						
2	9	4	4	8	10	4	4	7	4	8	4	5	71	6	4	4	6	3	5	7	3	32	5	8	7	5	5	10	LIA	6	8	49	8	152	6					
3	1	1	1	1	1	1	1	1	1	1	1	1	13	1	2	3	3	2	1	1	1	13	1	3	3	1	4	1	2	1	1	14	1	40	1					
4	5	9	6	6	3	3	6	3	8	4	1	9	7	63	5	9	3	10	6	7	5	5	51	9	7	8	6	6	2	6	2	6	37	6	157	7				
5	10	10	10	10	3	10	10	10	10	6	10	8	123	10	10	10	8	10	10	8	10	66	10	9	10	10	10	3	8	10	10	68	10	257	10					
6	7	6	8	5	8	5	7	2	3	7	4	6	74	7	7	6	5	7	6	4	35	6	5	1	4	3	3	1	7	5	28	3	137	5						
7	4	8	7	3	2	7	8	4	7	6	7	8	10	8	8	8	9	3	9	6	49	7	4	9	3	9	8	7	3	3	45	7	181	8						
8	8	7	5	7	6	8	5	9	6	3	3	7	3	89	9	5	5	7	8	8	9	50	8	10	6	7	8	6	5	8	9	54	9	193	9					
9	3	2	3	2	5	9	9	5	2	5	2	4	62	4	3	2	4	4	4	2	7	26	3	2	2	8	2	4	3	9	4	31	4	119	4					
10	2	3	3	4	4	2	3	8	5	2	2	3	44	2	6	7	1	5	2	3	2	26	3	6	4	3	7	7	LIA	5	2	34	5	104	3					
Sum	55	55	55	55	55	55	55	55	50	55	28	55	683	55	55	55	55	55	55	41	55	371	54	55	55	55	55	55	55	55	385	55	1439	55						

Issue	Ranking - AKL												Total	Overall Ranking	Ranking - CHC										Total	Overall Ranking	Continued	Continued Rank							
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12			Group 13	Group 14	Group 15	Group 16	Group 17	Group 18	Group 19	Group 20	Group 21	Group 22					Group 23	Group 24	Group 25	Group 26	Group 27		
1	7	8	7	7	8	8	9	8	7	3	3	94	3	7	6	9	5	8	8	5	48	3	9	5	7	3	6	6	7	6	38	7	180	3	
2	1	1	2	4	4	4	2	4	3	4	4	1	34	2	5	1	2	3	3	2	8	24	2	3	2	1	3	2	1	1	10	1	68	1	
3	5	3	6	6	3	9	4	3	5	6	5	10	77	6	9	7	3	4	4	4	4	35	4	5	?	8	2	7	5	3	7	36	6	148	6
4	8	7	3	3	7	7	5	6	9	8	8	8	81	8	2	9	1	6	3	3	8	44	7	8	6	3	3	8	3	8	5	42	3	177	8
5	9	6	8	5	6	5	8	7	8	7	3	5	77	7	3	8	7	3	3	9	45	8	6	2	6	4	8	8	6	8	38	7	160	7	
6	6	3	1	1	2	1	3	9	6	3	2	3	40	4	4	2	6	1	2	1	1	17	1	1	4	1	8	5	1	10	2	23	3	80	3
7	4	5	5	3	1	3	6	2	2	1	6	4	42	3	8	5	8	7	5	7	3	43	6	4	1	4	5	1	7	5	9	34	4	119	4
8	2	4	3	8	3	6	7	5	4	5	7	6	60	5	1	3	4	9	6	6	7	36	5	7	3	9	7	4	3	4	4	34	4	130	5
9	3	2	4	2	5	2	1	1	1	2	1	2	26	1	6	4	5	2	1	5	2	25	3	2	1	5	6	1	4	2	3	22	2	73	2
10	10	10	10	10	10	10	10	10	10	10	10	3	119	10	10	10	10	10	10	10	10	70	10	10	8	10	10	10	3	10	53	10	242	10	
Sum	55	55	55	55	55	55	55	55	55	55	55	55	660	55	55	55	55	55	55	55	57	387	55	55	55	55	55	55	55	55	330	55	1377	55	

Issue	Ranking - AKL												Total	Overall Ranking	Ranking - CHC										Total	Overall Ranking	Continued	Continued Rank						
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12			Group 13	Group 14	Group 15	Group 16	Group 17	Group 18	Group 19	Group 20	Group 21	Group 22					Group 23	Group 24	Group 25	Group 26		
1	4	7	8	3	3	2	2	3	3	4	5	44	5	1	5	3	3	1	6	8	39	6	10	3	3	6	6	2	10	3	37	5	120	5
2	2	3	2	1	4	3	1	2	4	5	4	31	1	2	1	1	6	3	3	2	18	1	5	8	2	2	5	3	2	7	29	3	78	2
3	7	4	7	7	7	7	6	10	10	7	7	73	7	8	6	10	5	9	7	6	51	8	9	4	7	8	7	5	10	50	8	180	8	
4	9	6	3	8	8	8	8	7	7	8	8	80	8	9	8	5	7	6	8	5	48	7	8	3	8	4	9	8	4	4	45	7	173	7
5	8	9	9	3	3	9	10	8	9	10	10	100	9	7	3	6	8	10	10	10	60	9	6	5	3	3	9	3	7	6	51	9	211	9
6	10	10	10	10	10	10	9	9	9	9	9	104	10	10	10	7	10	8	9	9	63	10	7	10	10	10	8	10	3	8	64	10	231	10
7	5	1	4	6	5	4	5	5	6	3	6	50	6	6	7	3	4	7	2	3	32	5	4	6	5	7	3	6	6	9	43	6	125	6
8	6	2	5	4	2	5	3	6	5	2	3	43	3	3	3	4	3	4	1	4	22	3	3	7	4	3	3	5	8	5	35	4	100	4
9	1	8	1	5	1	6	4	1	2	1	1	31	1	4	2	2	2	5	5	1	21	2	1	2	1	1	1	1	1	10	1	62	1	
10	3	5	6	2	6	1	7	4	1	6	2	43	3	5	4	8	1	2	4	7	31	4	2	1	6	5	1	4	1	2	21	2	35	3
Sum	55	55	55	55	55	55	55	55	55	55	55	605	53	55	55	55	55	55	55	55	385	55	55	55	55	55	55	55	55	55	385	55	1375	55

Issue	Ranking - AKL												Total	Overall Ranking	Ranking - CHC										Total	Overall Ranking	Continued	Continued Rank						
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12			Group 13	Group 14	Group 15	Group 16	Group 17	Group 18	Group 19	Group 20	Group 21	Group 22					Group 23	Group 24	Group 25			
1	3	7	1	1	1	2	1	6	3	2	2	23	1	1	1	1	2	1	1	8	14	1	3	1	3	1	1	4	1	14	1	57	1	
2	11	11	10	10	8	7	10	11	11	6	3	104	10	7	2	10	11	3	7	4	5	7	8	7	8	10	8	11	10	62	10	212	10	
3	10	2	3	3	3	7	10	9	3	10	7	8	90	8	6	11	10	8	10	5	10	53	10	3	6	4	3	7	10	3	54	8	197	3
4	8	6	8	5	10	11	5	4	8	3	1	63	6	3	5	6	5	6	2	4	23	4	6	9	7	11	5	5	6	43	6	147	5	
5	7	10	7	6	4	3	2	3	7	5	3	57	4	4	4	5	4	10	5	3	30	5	5	8	6	7	4	1	3	34	4	121	4	
6	3	3	11	11	11	8	11	7	9	11	11	108	11	9	11	8	9	11	6	3	57	11	7	10	5	8	6	6	11	53	7	218	11	
7	2	1	2	2	5	4	3	1	2	4	5	31	3	2	3	2	1	7	3	5	20	2	1	4	1	2	3	3	2	16	2	67	2	
8	1	4	5	4	2	1	4	2	1	1	4	23	1	5	7	3	3	3	4	1	22	2	2	5	2	3	2	2	5	21	3	72	3	
9	4	8	6	8	6	5	8	5	4	10	10	74	7	6	8	7	6	2	3	2	31	6	11	11	11	4	10	8	7	62	10	167	7	
10	6	3	4	7	3	9	7	8	6	8	7	74	7	10	10	9	7	5	10	6	47	8	10	3	10	6	11	9	8	57	9	178	8	
11	5	5	3	3	3	6	6	10	5	3	6	61	5	11	3	4	8	4	11	11	47	8	4	2	3	5	3	7	4	40	5	148	6	
Sum	66	66	66	66	66	66	66	66	66	66	66	726	64	66	66	66	66	66	66	66	396	64	66	66	66	66	66	66	66	66	462	65	1527	66

Results from Ranking Exercise, Auckland, Christchurch and Wellington Workshops

Issue	Ranking - AKL												Total	Overall Ranking	Ranking - CHC								Total	Overall Ranking	Ranking - WEL								Total	Overall Ranking	Combined Total	Combined Rank
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12			Group 13	Group 14	Group 15	Group 16	Group 17	Group 18	Group 19	Group 20			Group 21	Group 22	Group 23	Group 24	Group 25	Group 26						
1	Incorporation of tenant requirements and functionality into design and plans	1	2	2	1	2	1	1	2	2	2	16	2	1	3	2	2	1	2	10	2	1	1	1	2	2	2	1	3	1	35	2				
2	Earthquake-resistance measures incorporated into design	3	3	3	3	3	3	3	3	3	30	3	code	3	3	3	3	3	18	3	N/A	3	3	3	3	3	18	3	66	3						
3	Increased service life of components and increased reliability	2	1	1	2	1	2	2	1	1	14	1	2	1	1	1	2	1	8	1	2	2	2	1	1	2	3	2	31	1						
Sum		6	6	6	6	6	6	6	6	6	60	6	6	4	6	6	6	6	36	6	6	3	6	6	6	6	36	6	132	6						
Issue	Ranking - AKL												Total	Overall Ranking	Ranking - CHC								Total	Overall Ranking	Ranking - WEL								Total	Overall Ranking	Combined Total	Combined Rank
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12			Group 13	Group 14	Group 15	Group 16	Group 17	Group 18	Group 19	Group 20			Group 21	Group 22	Group 23	Group 24	Group 25	Group 26						
1	Increased capacity of floor space to allow for flexibility and growth	4	5	5	5	5	4	5	6	1	5	50	5	4	6	3	6	5	6	3	30	6	3	5	4	4	4	6	6	32	6	112	6			
2	Facilities to allow for changes in occupant requirements and growth	2	2	2	4	2	2	2	1	2	2	23	2	2	3	2	3	2	1	5	16	2	5	1	2	2	2	4	3	19	2	58	2			
3	Consideration of hours of occupancy	6	3	3	2	6	6	4	4	6	6	43	4	6	2	5	5	6	4	4	27	5	4	6	5	5	3	2	4	29	3	105	4			
4	Facilities to allow for changes in number of occupants	5	4	4	3	4	3	3	3	4	3	40	3	3	4	4	4	4	2	6	23	4	6	3	6	3	5	3	5	31	5	34	3			
5	Review of floor-to-floor height to accommodate future uses	3	6	6	6	3	5	6	5	5	4	60	6	5	5	4	2	3	5	2	22	3	2	4	3	6	6	5	2	28	4	105	4			
6	Flexibility to accommodate future uses	1	1	1	1	1	1	1	2	3	1	14	1	1	1	1	1	1	3	1	8	1	1	2	1	1	1	1	1	8	1	30	1			
Sum		21	21	21	21	21	21	21	21	21	21	231	21	21	21	16	21	21	21	126	21	21	21	21	21	21	21	21	147	21	504	20				
Issue	Ranking - AKL												Total	Overall Ranking	Ranking - CHC								Total	Overall Ranking	Ranking - WEL								Total	Overall Ranking	Combined Total	Combined Rank
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12			Group 13	Group 14	Group 15	Group 16	Group 17	Group 18	Group 19	Group 20			Group 21	Group 22	Group 23	Group 24	Group 25	Group 26						
1	Management systems, procedures and plans	6	10	4	10	6	7	4	9	1	8	9	74	6	7	1	6	3	1	4	2	30	3	3	5	2	5	8	3	1	21	3	125	5		
2	Environmental quality within the building	2	4	1	4	2	1	3	2	5	2	10	3	39	2	6	7	3	3	7	6	38	5	4	7	1	2	2	1	2	14	2	91	2		
3	Energy efficiency	1	1	5	1	1	2	1	1	2	3	4	4	26	1	3	2	1	2	1	4	14	1	2	1	3	1	3	2	3	11	1	51	1		
4	Transport	3	2	8	2	3	3	2	3	4	5	3	2	40	3	10	7	3	8	7	5	9	43	8	7	9	7	6	1	9	5	28	6	117	3	
5	Water efficiency	7	7	6	7	7	5	9	8	3	9	5	5	78	8	4	3	2	2	5	6	7	29	2	2	2	4	8	5	7	6	25	5	132	7	
6	Materials	4	6	3	6	4	4	5	7	8	4	7	6	70	5	5	5	4	4	2	5	30	3	5	6	5	3	6	6	4	24	4	124	4		
7	Land use and ecology	8	3	2	3	8	8	8	4	6	6	2	1	59	4	8	8	4	6	6	8	1	41	6	1	3	6	7	4	1	8	28	6	128	6	
8	Emissions, effluent and pollution	5	9	3	9	5	6	6	5	3	7	6	7	77	7	9	4	8	7	8	9	53	9	4	8	8	4	10	5	9	39	9	163	9		
9	Quality, service and risk	3	8	10	8	9	10	10	10	10	8	10	112	10	1	9	10	10	10	10	10	60	10	8	10	3	10	9	8	10	48	10	220	10		
10	Flexibility and adaptability	10	5	7	5	10	9	7	6	7	1	3	3	85	3	2	10	9	5	3	3	41	6	6	4	10	9	7	4	7	37	8	163	8		
Sum		55	55	55	55	55	55	55	55	55	55	55	660	55	55	55	55	55	55	55	385	53	42	55	55	55	55	46	55	275	54	1320	55			

Work groups have been randomly numbered and the rankings that they assigned to each issue are in columns; 1 being most important and 10 least important. Auckland feedback has been colour-coded yellow, Christchurch is blue and Wellington is green. Those groups that gave equal rankings or did not rank all issues have been highlighted in red and are generally not included in the overall rank for each issue. Overall rank of importance for each issue has been calculated for each workshop at the end of the corresponding row, and then for all workshops as a whole (purple cells).