OVERCOMING THE BARRIERS TO DECONSTRUCTION AND MATERIALS REUSE IN NEW ZEALAND

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ABSTRACT

The New Zealand Government has recently published a strategy document which sets the nation a target of reducing construction and demolition waste going to landfills by 50% of the 2005 figure by 2008. Half of the Territorial Authorities in New Zealand have set themselves the even more ambitious target of zero waste by 2015.

This paper discusses the ways in which deconstruction and materials reuse could contribute to achieving these targets, outlines the general and New Zealand specific barriers to realising such targets and discusses ways in which these barriers might by overcome in the New Zealand context.

KEYWORDS: Deconstruction; Barriers; Solutions; New Zealand

INTRODUCTION

New Zealand is a country of four million people, living in an area of 268,021 square kilometres, which is roughly equivalent on both counts to the state of Oregon in the USA. It consists of two main islands, is 1600 kilometres (1000miles) in length and is located some 1300 kilometres (800 miles) east of Australia. Auckland is the only conurbation of more than one million people, although there are two other conurbations with populations of more than 350,000 and a further three with populations in excess of 100,000 people. These centres are distributed along the entire length of New Zealand, although three-quarters of the population lives on the slightly smaller north island. Away from the generally quite small central business districts (CBDs), urban settlement is dispersed and consists mainly of one or two storey light timber frame construction. Construction within CBDs employs the full range of building materials and construction systems utilised internationally. Population is dispersed and travel distances between centres can be quite large.

The research for this paper was conducted as part of extensive research into the current state of deconstruction in New Zealand, with the intention that this information would be correlated into a national report on deconstruction in New Zealand as part of the authors’ participation in the CIB Task Group 39 on international deconstruction activity. The research was undertaken by a thorough review of existing published material related to the topic, a
review of the legislative framework within which deconstruction exists in New Zealand, and a series of interviews to establish industry or local council opinion where information was lacking or out of date in published form.

The NZ government, in their recently released policy document *The New Zealand Waste Strategy – Towards Zero Waste and a Sustainable New Zealand 2002*¹, requires a 50% reduction by weight in construction and demolition waste going to landfills by 2008, but this strategy document has as yet has no legal standing and offers no construction and demolition (C&D) waste specific ways to accomplish this objective. The Ministry for the Environment who prepared and promulgated the document states: “The strategy acknowledges the limits of the information on which the targets are based. It indicates that the targets should be considered as "goal statements rather than mandatory requirements". The targets are to be reviewed by December 2003. In the meantime councils are encouraged to set their own targets in line with those in the strategy. This request recognises that it may be impractical for local targets to be the exact equivalent of the provisional national targets”.² The Ministry for the Environment expects to produce a consultative regulatory document sometime in 2004 and may enact legislation on this topic thereafter. However, further action by the Ministry for the Environment on C&D waste minimisation remains unclear at this time.

The implementation of waste minimisation policies is the responsibility of local Territorial Authorities in New Zealand rather than the direct responsibility of Central Government. Over half of the Territorial Authorities (TAs) in New Zealand have declared that they will aim to have zero waste by 2015. This self-imposed target goes well beyond government expectations and is an encouraging sign for the future. The zero waste goal continues to receive the encouragement of Central Government but very little financial or legislative support.

Although the often-quoted figure for construction and demolition waste in New Zealand is 17%³ of municipal solid waste generation, this figure does not include C&D waste taken to privately owned ‘cleanfill’ dumps or illegal dumping of C&D waste. Neither does it include figures from all Territorial Authorities. Dumping charges vary widely, with some being free for hardfill and in other situations over $NZ 100 per load. Often cleanfill dump rates are very much cheaper than municipal landfill rates⁴. Therefore, although there are currently no accurate figures for C&D waste, it is certainly considerably higher than the 17% of total waste figure.

Currently the government’s main motivation for reducing C&D waste is to reduce pressure on landfills. The concept that it would be possible to concurrently reduce waste generation and resource depletion, and maximise the utilisation of our existing material investments, does not seem to be part of government thinking at this point in time. Nevertheless it obviously makes good sense to do this from a national perspective, both economically and environmentally. In general the signs are positive with regard to waste minimisation in New Zealand but the linkages to deconstruction and the opportunities for resource conservation through material and component recovery, which are implicit in deconstruction strategies, are not currently widely recognised.

Deconstruction of existing buildings is more labour intensive than demolition and provides increased employment opportunities, which also supports government policies. But again this fact is not widely understood.
In addition to the general lack of awareness of the overall benefits of deconstruction there are significant barriers to the widespread adoption of deconstruction strategies in New Zealand, although none are insurmountable given the current governmental and local authority interest and support for waste minimisation in general.

If widely adopted deconstruction could provide a significant way to enable the New Zealand Government to realise its stated intentions with regard to C&D waste.

LEGISLATION

Existing legislation related to construction and demolition waste minimisation is spread throughout a number of acts, policies and targets in NZ. A helpful way for people to be made aware of their existing responsibilities and the inherent opportunities might be the creation of a comprehensive document encompassing all environmental policies related to the construction industry. Such a document would make existing legislation much more accessible and understandable and therefore more usable.

The lack of performance specifications and testing regimes for reused components is linked to current difficulties in acquiring council approval for building consents and this situation is cited by some demolition contractors as a barrier to the incorporation of pre-used materials and components into new development⁵. Often local councils will not approve⁶ the use of recycled components especially in relation to structural and energy conservation use because of the lack of certainty connected such items. Achieving New Zealand Building Code compliance with reused materials and components needs to be researched and systems put in place to remove this barrier for people wanting to reuse materials and salvaged components. The development of nationally accepted standard specifications and certification for reused components and materials would save time and confusion during the approval process.

The actual amount of C&D waste is currently unclear and there is an urgent need to establish an accurate database. Central government is encouraging this. The target date for completion of this phase of the work is 2005 but there is as yet no legislation to back up this request. Local authorities are currently being left to devise their own measurement criteria and this will undoubtedly lead to a considerable number of compatibility problems in the future and a waste of resources and time their eventual integration into the necessary national database. It is therefore important that the Ministry for the Environment establish as a matter of urgency clear guidelines concerning the statistical criteria required as the basis of future waste minimisation action.

The Ministry for the Environment is currently evaluating which areas of waste reduction are priority targets for incorporation into legislation in the next 12 to 18 months. With regard to construction and demolition waste, the Ministry has stated that:

“This target is one of the secondary stream of targets in the Strategy, in that reduction is not expected to be achievable immediately. The Ministry has initiated a Waste Management Planning project that will provide a base for this work to proceed in the near future.”⁷

The Ministry acknowledges that no action has yet been undertaken in this area.⁸ It is unclear why the Ministry regards C&D waste as a second priority issue although it may be in part due
to the misconception that we are only dealing with about 17% of the waste stream and the notion that C&D waste is rather more environmentally benign than many other waste sectors.

To ensure success, the waste strategy needs to be reinforced by mandatory requirements, and followed up by additional transitional support and funding. In the absence of common national guidelines, technical backup and a legislative base from which to operate, each local authority establishes and implements waste minimisation and management strategies within its own local area. These schemes vary widely in terms of their effectiveness, and can and are changed at the political whim of both elected officers and non-elected officials. However the publication of the national waste strategy has at least indicated central government thinking on the issues and initiated considerable and widespread debate concerning C&D waste amongst some local authorities.

Currently C&D waste has only been addressed seriously by a few of the councils, in particular those of the larger centres such as Auckland, Hamilton and Christchurch. Some smaller councils have also made attempts to address construction and demolition waste by working in close collaboration with neighbouring councils, primarily to establish a larger market for recovered materials and components. These councils tend to be in higher density areas or in areas which are adjacent to the main centres. For some areas, particularly in the smaller, more isolated areas of the country, or where little development is occurring, construction and demolition waste is less of a percentage of the total waste stream and therefore is regarded as less of a priority to target for action.

MARKETS

Unless there is a market for recovered materials there is very little point to deconstruction. Any barriers therefore, to establishing, maintaining and developing markets are fundamental to the development of deconstruction practices in NZ.

There are two distinct market sectors related to resource recovery, each with their own characteristics and issues. Markets for low volume, high value, rare, unique or antique architectural components appear to be well established or developing, and are largely self-supporting economically. This sort of recycling occurs nationally almost irrespective of the size and financial circumstances of the locality. Many of these recyclers are small, essentially connected to the domestic market and will pass customers on to other similar organisations if they do not have the items the client requires. Native timber and bricks are also often held in the salvage yards of demolition contractors. The market for such items is flourishing and it is often difficult to meet demand. Specialist equipment and machinery is sometimes recovered from buildings and often pre-sold before removal.

Some other recovered materials are high volume, low value, such as concrete. The market for such materials in New Zealand is currently restricted and is mainly in Auckland where there is a shortage of readily accessible, local aggregate. For more geographically isolated areas with low or dispersed populations it is more difficult for the salvaged goods market to grow due to the scale of economy and the inherent physical and economic feasibility of creating usable products and finding local markets or transporting heavy and bulky items to larger centers. Growth in these areas would require subsidies which would have the effect of distorting the market and would be unlikely to find favour in the current political climate.
It may be possible for interested local authorities to cooperate on a regional basis to increase the volume of materials being recovered, and make it financially viable to purchase more efficient recovery equipment. Such equipment could travel around the region as necessary to building sites or temporary holding dumps and the recovered materials might be used in council projects. The obvious advantage in this approach is that transportation of the heavy unprocessed C&D waste is kept to a minimum, and in more isolated areas premiums for storage may be less than in the major cities.

Direct sales of the processed material from the site of processing will mean transportation is minimised and this practice should be encouraged. TAs might also provide free or very low cost dumping of separated clean C&D waste which would facilitate future recovery once volumes or market conditions permitted this\textsuperscript{14}.

Grants from central government might be necessary to encourage the smallest or most remote local authorities to initiate and maintain a waste minimisation programme as a service to the community even if it is not financially viable.

Another possible solution to this problem of small spread out communities and markets is to encourage innovation. One of the problems identified by some of the councils, particularly those involved with the Zero Waste programme is that the collection, sorting and treatment of waste is less of an issue that finding uses for it afterward\textsuperscript{15}. If new and diverse, localised uses for waste C&D material can be identified and developed this may help to solve the problem of how to deal with waste in smaller communities. Some councils have hired consultants for local market opportunity research\textsuperscript{16}, and some are currently in the process of looking into opportunities in their own regions. The authors are involved in teaching a university course in which one of the assignments is to invent and develop new materials or products using waste. Achieving secure and economically viable volumes of waste/recycled materials in remains one of the most intransient problems in rural areas.

The current government in New Zealand has already made a commitment to further innovation and scientific research through the ‘Science and Innovation policy of 2002’\textsuperscript{17}. It asserts that: ‘A key goal of this policy is to actively promote economic transformation. It also aims to further our understanding of our environment, and effectively contribute to solving the social challenges we face.’\textsuperscript{18} This is a potential starting point for researchers or innovators to secure funding.

There would appear to be some resistance amongst the general public, designers and amongst many builders to use pre-used materials. This is a worldwide problem and is of course not a single problem but a series of interlinked issues. The collective effect is to inhibit the use of pre-used materials and components and make their use the exception rather than the rule, at least in new buildings.

With the public there seem to be two contradictory influences at work. New Zealand has in general terms the same consumerist attitudes and perceptions as the rest of the westernised world. The notion that pre-used is inferior and that wear makes items undesirable and unfashionable seems pervasive and is perhaps the inevitable result of years of advertising which has consistently lauded the new, fashionable and unblemished.

This is counteracted to a certain extent in New Zealand by the perception that many new building materials are not as durable as older materials. This is particularly true when
comparisons are being made with items such as native hardwood which extremely durable but is now difficult and expensive to source new in any but recycled form. Recycled timber is therefore much sought after and commands high prices. There seems to be little resistance to the use of pre-used items in alterations to existing buildings where there is a need to match what is already there. However the market for pre-used items in new buildings remains small. This may however be more a result of what owners think of as being appropriate in a design rather than a resistance to the reuse of materials. There is no known research concerning whether people living in older houses have a different attitude to the reuse of materials compared with those living in new houses in New Zealand. Such research could be very important in establishing a wider market for pre-used materials, as education could then be targeted into addressing misapprehensions amongst the public at large.

Amongst designers the imperatives appear to be somewhat different. Certainly designers are very fashion conscious and may well be resistant to the employment of obviously pre-used materials and components visible in the finished work, unless they, as designers, are making a deliberate design statement. A growing number of designers are in fact using pre-used materials in this way, but this constitutes a tiny fraction of the materials used in new buildings.

When materials are not seen in the final work the issue is generally one of liability. Most specifications while not specifying ‘new’ materials do call up the notion of them being ‘the best of their kind and in compliance with the performance and durability requirements of the New Zealand Building Code’. If new materials are used and have been assessed as being code compliant and they fail, designers and structural engineers generally feel confident that they will not be held liable. However with reused materials the situation is not nearly so straightforward. Many designers feel that they are taking an increased personal risk and few are willing to do this in the absence of any pre-used materials testing or certification schemes in New Zealand.

Clients too may feel the need for the reassurance that certification brings to the employment of pre-used materials. There is a need for a grading and certification scheme at least for recycled timber in New Zealand if markets in this area are to expand. This would also help to still the concerns of building inspectors who are often rather dubious about the employment of ‘second-hand’ materials and components, especially when used in structural or drainage/plumbing situations. Certification of pre-used materials could either be organised through industry groups or the Building Industry Authority which promulgates building controls in New Zealand. Research into pre-used materials and recycled/virgin mixes would add certainty. Some of this might initially need to be from public good research funds but once a market is established commercial organisations would probably fund research in their own market sector.

For builders the main issue is the extra time and effort it takes to access and prepare pre-used materials in sufficient quantity, sizes and quality. It is obviously far easier and more convenient for them to ring up a single builder’s merchant, than to access materials from a whole series of smaller outlets. The answer might be for builder’s merchants to stock pre-used materials and components but this is unlikely to happen in the foreseeable future as the two main chains of builder’s merchants in New Zealand are owned by large, diversified companies who produce or import many new building materials and so have a vested interest in selling new product, preferably their own.
As can be readily appreciated, clients and designers need to be quite determined to use pre-used materials and components in new buildings as the principal benefit is resource conservation rather than cost saving. The extra time, effort and risk involved to the designer is rarely recognised in fee payments. Yet unless the demand is there the market will not grow and deconstruction will remain the exception rather than the rule.

As central government and many local authorities are committed to general waste reduction, which is synonymous with resource conservation, they need to help the market to grow. If they insisted that a proportion of pre-used materials were used in all public works then market conditions would change overnight, the exception would become the rule and would lead to a more stable and stronger market for the C&D salvage market. If the market demand was there, many of the other problems and issues either fall away or there would be enough commercial interest to solve them.

It is unlikely in the New Zealand context that legislation would be enacted that would require private sector buildings to incorporate pre-used materials. So persuasion and education is required, to explain the benefits to the community and the individual of resource conservation, to address misapprehensions concerning the long-term viability of pre-used materials and to turn around the public’s negative impressions concerning ‘second hand’ materials.

One of the strategy programmes of the ‘information and communication measures and actions’ contained in the NZ Waste Strategy, is to “develop and implement programmes for public information and education”\textsuperscript{20}. It is perceived that there is a lack of resources to effectively deal with waste and waste minimisation education. Environmental education that does occur is usually localised and many councils and community groups would like to see more direct central government leadership in this area with the provision for and encouragement of standardised national environmental education in the primary, secondary, tertiary and continuing professional development areas.\textsuperscript{21}

There is a perceived lack of New Zealand specific information and case study examples concerned with implementing deconstruction. The government could fund the production of such documentation and demonstration projects as part of its information and education strategy under the NZ Waste Strategy.

THE CONSTRUCTION AND DEMOLITION INDUSTRY

The demolition industry in New Zealand is largely unregulated at present, although there is an ‘Approved Code of Practice for Demolition’\textsuperscript{22}, which emanates from the Department of Labour’s Occupational Safety and Health service (OSH) and deals with safe practice. Despite this people who demolishing buildings in New Zealand are not required to have any professional qualifications. The unregulated nature of the industry is beginning to be addressed through the NZ Demolition Contractors Association’s push for nationally recognised qualifications and the development of a standard code of ethics.\textsuperscript{23} However, the NZDCA is sometimes perceived as an Auckland based organisation rather than a nationally representative organisation by some demolition contractors outside of the North Island.\textsuperscript{24}

There is a general lack of networking within the industry which may be a result of the contractors operating in a very competitive market, the localised nature of most demolition
contracting organisations and great disparities in the skill levels across the industry. Survival is the prime motivator for most demolition contractors and issues such as waste minimisation and environmental responsibility are generally not seen as a priority. The building industry as a whole is very fragmented and hierarchical, with little meaningful dialogue on broader environmental issues between architects, designers, builders and demolition contractors. Increased cooperation and networking may facilitate greater understanding of life cycle issues in design and construction and help to engender a greater level of collective environmental responsibility by the industry particularly in relationship to achieving a greater understanding of the direct impact design has on demolition. However unless economic benefits can be clearly identified and information on how such benefits accrue to the various parties involved disseminated, such voluntary action is likely to involve only a small minority of the industry organisations.

Several demolition contractors contacted have stated that if buildings and internal components were easier to disassemble, there would be greater materials salvage and possible reuse. This call for increased design for disassembly is an issue that designers, and tertiary architecture and design teaching establishments need to take on board. Currently however there is little discussion of these issues in tertiary institutions or within continuing professional development (CPD) environments. Very little research is currently being carried out concerning suitable designs and construction practices in regards to life cycle considerations or deconstruction. It is probably true to say that the design professions and most tertiary educators in New Zealand remain largely ignorant of life-cycle resource conservation and deconstruction and demonstrate little inclination to take these issues onboard.

In the absence of leadership from either the professions or tertiary providers on this issue it may be that regulation or incentives may be required to ensure progress. However there are some individuals and organisations who have demonstrated an interest and one step forward may be to simply provide a vehicle for cross industry dialogue to occur, perhaps leading to the development of a pan industry organisation to address the whole issue of waste minimisation and resource recovery. It is known that a number of research proposals are currently being considered by central government in this regard.

ECONOMIC FACTORS

In the last few years there has been an increased interest in salvage within the demolition industry. The primary driver for this observable increase has been in all cases economic rather than environmental. The main barrier to further development in this area is also however economic. There is considerable variation from region to region concerning the economics of resource recovery.

In some of the larger centers such as Auckland and Christchurch where an increase in salvage has been noted among demolition contractors, one of the main sources of profit is in the on-selling of the salvaged materials and the avoidance of high tipping fees. This is particularly relevant in Auckland where salvage rates of up to 95% have been achieved by the larger companies such as Ward Demolition in some situations. In the existing highly competitive market, tenders are sometimes offered at a price lower than the cost of demolition with profit coming from the salvage sold.
In centres such as Wellington however, the lower cost of raw materials means a less stable and profitable salvage market. This, combined with the increased health, safety and operational requirements and low landfill charges makes comprehensive resource recovery less viable in most commercial situations. Salvage in these circumstances is restricted to only the highest value materials such as native timber, metals, lime-mortared brickwork and some easily removed fixtures and fittings.\(^{34}\)

Strengthening the salvage market through some of the options already discussed, such as recycled component quotas would help to turn this situation around but often the real problem in the commercial sector is the unwillingness of developers to allow sufficient time for deconstruction to occur. In many cases developers are working with borrowed money, at high interest rates and endeavour by every method possible, to shorten their loan period and so maximise their profits.

Demolition requires a resource consent in New Zealand and some local authorities are considering the introduction of the requirement for mandatory waste minimisation plans to be lodged and adhered to as a condition for granting resource consent. Target two of the waste minimisation targets in the New Zealand Waste Strategy states: ‘By December 2005, all regional councils will ensure that new or renewed industrial resource consents include a recognised waste minimisation and management programme...’\(^{35}\) However this target is not yet part of the C&D waste part of the Strategy. Even if it were such a procedure will only be meaningful in terms of the salvage of components and materials from construction and demolition activity however, if markets are available for the recovered materials. The notion of a percentage of the materials from the demolished building being reused in the new building which replaces the pre-existing one has only been considered by a few of the most forward thinking local bodies\(^{36}\) as yet and none yet have a requirement that a proportion of recycled materials be incorporated in their infrastructure or building work nor do they require new buildings be designed to facilitate disassembly.

Many of the larger demolition companies have a large workyard and storage of recovered materials prior to sale does not appear too much of an issue. However in small communities it may be that local authorities rather than demolition contractors will need to be proactive in the provision of sorting stations, storage facilities, and perhaps organise the processing and on-sale of recovered materials. Moratoria on or relief from local taxes can also be an effective way of ensuring the economic viability of a recycling organization, particularly at startup.

Another option which is common in other countries but is currently relatively rare in New Zealand is for demolition jobs to be advertised, ahead of time with salvagers, community groups and the public being allowed to take as much as they wish, using their own time and labour, paying as they leave with their acquired wares. This is a form of on-site selling which is successful in a variety of different forms. There are however health and safety issues involved and with the strict regulation of these matters in New Zealand this is not seen as a preferred option in most circumstances. However prior notice would allow individuals and organisations to identify the salvaged items they wish to purchase for removal by professionals. One major organisation in Auckland, Nikau Deconstruction Engineers Limited, has a sales manager who secures sales for large, specialised or unusual equipment before the demolition begins, so that goods can be transported straight from the site to their
new owners, thus avoiding additional transportation and storage costs. Sometimes these sales will go offshore to places like Malaysia.37

TECHNICAL ISSUES

Often lack of detailed information on the actual materials and construction systems employed in a building adds to the uncertainty of deconstruction. This may affect both its technical and economic feasibility. While the original contract drawings are usually available and will give much valuable information, substitution of materials noted in the specification is common, as are unrecorded changes which occur during the life of the building. There seems to be no easy, workable answer to this problem except to stress the need for a careful and thorough pre-demolition survey by skilled staff. Currently all buildings require a pre-demolition survey as part of the resource consent process, to establish whether or not there are any hazardous materials incorporated into the works. This could be easily extended into a condition survey which would verify or reveal variances between the archived documentation and the reality in terms of materials and construction.

There has been some discussion concerning the possibility of applying the notion of extended producer responsibility (EPR) to building products. This would mean that the original manufacturer would be responsible for recycling ‘their’ products at demolition and the national waste management strategy document sees this as a long-term possibility. Superficially this is an attractive notion, however unlike cars and other consumer products building products often have an extended lifespan and manufacturers may well go out of business long before their building products come to the end of their lives. Often the components or systems used where EPR might be most sensibly employed are manufactured in other countries which would make enforcement difficult if not impossible. There are however some possibilities in relation to items with a short lifespan such as proprietary equipment. This might be a particularly effective solution if these items were leased rather than bought, which is an increasingly common way of dealing with interior fit out elements and could easily be extended to services installations, and kitchen and bathroom equipment.

Quite a number of new materials coming into New Zealand from overseas are given subsidies in their country of origin and this makes it difficult for recovered materials and products to compete. This is particularly difficult for a country like New Zealand to deal with as New Zealand seeks to avoid both subsidies and tariffs.

The use of composite materials chemical bonding and other non-reversible building techniques continues to expand. All such methodologies make deconstruction of buildings more difficult. This is a fundamental problem which could be addressed by insisting that all manufacturers of such systems develop a safe, cost effective method of disassembly before they are allowed to market their product. Such a law is unlikely to be initiated in New Zealand but may be attractive to the European Union.

CONCLUSION

Deconstruction as a concept is currently little understood in New Zealand. However central government has declared its strong support for the notion of reducing construction and demolition waste in New Zealand by 50% of the 2005 figure by 2008. The widespread
adoption of deconstruction practices in New Zealand could make a major contribution to the realisation of this target.

Lip service to waste minimisation strategies has occurred in the past with very little action being forthcoming. Therefore, although it is very encouraging that the current government seems to be taking the matter rather more seriously than previous governments, little action is occurring at present and C&D waste has been given a low priority for action and presumably funding. The government has however proved itself to be fairly flexible in its response to changing information and if presented with an action plan which would enable it to reach its desired goals at minimal cost, it would be likely to listen.

Developing the market for pre-used building materials and components is perceived as the key action in this respect in New Zealand. If central and local government would be prepared to set minimum quotas for the use of pre-used materials in their own building and infrastructure work, this would change the entire nature of the market at little or no cost to itself. Such action is seen as the most positive step government could take in relation to reducing C&D waste taken to landfills in New Zealand. This action would create a strong and stable market and encourage all parties to invest in equipment and training. It would also provide demonstration projects which would encourage emulation by the private sector. Central government must be seen to lead this initiative otherwise few Territorial Authorities are likely to see their own individual actions as being significant enough to change the market place and with it the economic viability of deconstruction practices.

Deconstruction is very much in its infancy in New Zealand and education and research is needed to raise its profile and to provide usable information and actively promote deconstruction as a worthwhile and viable option to make a real and significant contribution to achieving the government’s resource recovery targets. Several research programme proposals are being prepared currently and there are a number of government agencies to which applications for funding can be made with some hope of success.

There is a need for all the involved parties to get together and start to listen to and understand each other’s points of view, issues and problems. Only then can common ground be found and consensual solutions established. A starting point for such a process may be the organisation of a C&D focused conference for all interested parties.

The outlook for the development and adoption of deconstruction practices in New Zealand is quite positive even though there is still a long way to go. There is a need to learn from successful international efforts in this area, but New Zealand can move very rapidly to pick up worthwhile ideas and adapt them to its own circumstances. The political and social climate is right for this to happen with respect to deconstruction in New Zealand at this time.
### Universal Barriers to Deconstruction

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<td>Standards give the impression that new materials must be specified.</td>
<td>Development of standard specifications etc, which incorporate reused/recycled components. Document and publish examples of the successful use of reused and recycled components. Government and local council as examples in new development.</td>
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<td>Finding uses for some recycled or salvaged materials is difficult</td>
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<tr>
<td>The benefits of deconstruction are long term and collective</td>
<td>Current climate of first cost only economic development.</td>
<td>Enforceable legislation and increased requirements in building consent approvals Government set measurable and monitored targets Increased education on environmental building impacts for developers.</td>
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<tr>
<td>Lack of financial incentive for deconstruction</td>
<td>Implementation of economic incentives and deterrents to encourage deconstruction.</td>
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<tr>
<td>Market pressures - the current climate of ‘as fast as possible’</td>
<td>Limited time to salvage maximum materials in the demolition stage. Deconstruction takes longer.</td>
<td>Subsidies to demolition contractors – transitional only Salvage operations to work along side but independently of demolition contractors. Transferal of environmental responsibility to developers.</td>
</tr>
<tr>
<td>It is difficult to access or apply economic assessment tools for deconstruction or LCA in some cases.</td>
<td>There are no NZ specific deconstruction evaluation tools or national feasibility studies.</td>
<td>Collection of existing tools in one place. Possibly website. Development of non region-specific tools or more flexible parameters. NZ: The development or adaptation of deconstruction economic viability tools for NZ A deconstruction economic viability feasibility study for NZ</td>
</tr>
<tr>
<td>Deconstruction needs a more skilled workforce than demolition</td>
<td>Unregulated demolition industry Lack of case jobs to train on.</td>
<td>Increased opportunities for training and transition from traditional demolition to deconstruction. Cooperation between the construction and demolition sectors.</td>
</tr>
<tr>
<td>Lack of documentation</td>
<td>Records of materials used in construction are not kept.</td>
<td>Better recording of materials used Storage of records in the actual building</td>
</tr>
<tr>
<td>Increased use of insitu technology, chemical bonds and plastic sealants etc.</td>
<td>Commonly used in new buildings in NZ. Most concrete structures have insitu components.</td>
<td>Research viable alternatives to these techniques. Development of ways to separate these bonds</td>
</tr>
<tr>
<td>Most existing buildings are not designed to be deconstructed.</td>
<td>This is true in NZ.</td>
<td>Research and development to find ways to effectively deconstruct these buildings. Implementation of design for deconstruction techniques into learning establishments a priority.</td>
</tr>
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</table>

**NZ specific barriers**

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Solutions</th>
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<tbody>
<tr>
<td><strong>1. Legislation:</strong></td>
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<tr>
<td>Confusion as to what Government / NZIA etc legislation is, relating to environmental responsibility</td>
<td>Compilation of all NZ environmental policy/targets etc related to construction Clarification of The NZ Waste Strategy targets</td>
</tr>
<tr>
<td>Inconsistent units of measurement in local waste data, no national data.</td>
<td>Clear, standardised units to be developed to make a national database</td>
</tr>
<tr>
<td>Waste management is a local council responsibility. This means there is no enforced national direction.</td>
<td>Increased central government financial and legislative support and direction</td>
</tr>
</tbody>
</table>

**5 Technical Issues:**

- Lack of documentation
- Increased use of insitu technology, chemical bonds and plastic sealants etc.
- Most existing buildings are not designed to be deconstructed.
| **C&D waste minimisation is not a priority for some local councils / central government** | **Support given to councils to move towards greater waste minimisation (zero waste)**  
Support of councils to change the priority waste rankings  
Reports to identify barriers to increased C&D waste minimisation and market opportunities. |
|---|---|
| **2. Markets:**  
NZ’s small, dispersed population and geographic isolation. | **Cooperation between smaller areas to increase markets.**  
Mobile recycling / processing plants  
Identification of local market opportunities. |
| **3. Economic Factors:**  
Low tipping rates (including cleanfill). | **Tipping rates need to come into line with the true cost of disposal.**  
Use of the Ministry for the Environment ‘Landfill full cost accounting guide’  
Many local governments have already introduced ‘user pays’ waste schemes and increased tipping fees. |
| **4. Technical Issues:**  
Some new materials are cheap | **NZ has no control over foreign systems or subsidies.**  
True cost research to establish taxes for imported materials either at import or retail stage.  
Central and local governments to specify materials which do not undercut the salvage market.  
NZ is in a high seismic activity region. | **Research into systems that work in seismic areas.** |

4. For example in the Tauranga District, tipping rates are approximately $98 per tonne at landfill and approximately $10 per tonne at the cleanfill.  
Kliskey, Murry, Solid Waste, Senior engineering Officer, Tauranga District Council, *personal phone conversation*, 31/01/03.  
5. Owles, Randel, General Manager, Ward Demolition, Auckland *personal correspondence*, 22/01/03  
6. New building and renovation requires a building consent, which is approved by local authorities in NZ in accordance with the non prescriptive *NZ Building Code*.  
9. Christchurch City Council has set up ‘Target Zero’. This is a resource efficiency/waste minimisation initiative working with Christchurch businesses to save money and reduce environmental impacts. They have set up a construction waste minimisation directory, conducted construction waste reduction case studies, and commissioned reports into the C&D waste stream and recommendations from consultants.  
Phillips, Laine, Resource Efficiency Advisor, Christchurch City Council, *personal phone conversation*, 22/01/03.  
10. REBRI – Resource Efficiency in the Building and Related Industries is an initiative jointly funded by the Auckland Regional Council, Auckland City Council, BRANZ and the Ministry for the Environment.  
The Auckland region councils work for example together in various ways, meeting, sharing information and supporting each others’, or collaborative projects. Some of these councils are large city based councils such as the North Shore City Council. Others like the Rodney District Council are smaller without a large city based population.  
Harris, Julie, Zero Waste Officer, Rodney District Council, *personal telephone conversation*, 22/01/03.
11 David Reece, Engineer/Services Manager, Opotiki District Council, personal correspondence, 22/01/03
12 Carter, Helina, Service Manager, Nikau Deconstruction Engineers, Auckland personal correspondence, 23/01/03
13 Bradshaw, Deborah, Policy Planner, Nelson City Council personal correspondence, 22/01/03
14 Kearney, Matt, Refuge Consultant, Far North District Council, personal correspondence, 22/01/03
15 Longworth, Mike, Resource Engineer, Masterton District Council, personal correspondence, 22/01/03
16 Reece, David, Engineer/Services Manager, Opotiki District Council, personal correspondence, 22/01/03
17 Schafer, Helen, Zero Waste Coordinator, Porirua District Council, personal correspondence, 22/01/03
18 Phillips, Laine, Resource Efficiency Advisor, Christchurch City Council, personal phone conversation, 22/01/03.

19 Owles, Randel, General Manager, Ward Demolition, Auckland personal correspondence, 22/01/03
21 Schafer, Helen, Zero Waste Coordinator, Porirua District Council, personal correspondence, 22/01/03
22 Minister of Labour, Approved Code of Practice for Demolition, Occupational Safety and Health Service, Department of Labour, Wellington, New Zealand, 1994.
23 Carter, Helina, Service Manager, New Zealand Demolition Contractor’s Association, personal correspondence, 22/01/03
24 Allan, Director, Southern Demolition, Christchurch personal correspondence, 22/01/03
25 Kendrick, Terry, Director, Harbour City Demolition, Wellington personal correspondence, 22/01/03
26 Edge, Allan, Director, Southern Demolition, Christchurch personal correspondence, 22/01/03
27 Ross, Steve, Manager, Nash and Ross Contractors Ltd, Dunedin, personal correspondence, 22/01/03
28 Kendrick, Terry, Director, Harbour City Demolition, Wellington correspondence, 22/01/03
29 Dalloz, A, The Contribution of New Zealand Local Authorities to the Promotion of Cleaner Production: Are rules appropriate instruments? The example of the building industry in the Auckland region, Department of Planning, University of Auckland. 1997
30 Kendrick, Terry, Director, Harbour City Demolition, Wellington correspondence, 22/01/03
31 Owles, Randel, General Manager, Ward Demolition, Auckland personal correspondence, 22/01/03
32 Owles, Randel, General Manager, Ward Demolition, Auckland personal correspondence, 22/01/03
33 Edge, Allan, Director, Southern Demolition, Christchurch personal correspondence, 22/01/03
34 Owles, Randel, General Manager, Ward Demolition, Auckland personal correspondence, 22/01/03
35 Kendrick, Terry, Director, Harbour City Demolition, Wellington correspondence, 22/01/03
37 Currently one of the Timaru District council buildings is being refurbished, deconstructed and demolished. The façade is being retained and it is planned that most of the material that is salvaged will be reused in a new second hand resource recovery centre that the council is building.
Woodnorth, Briony, Zero Waste Advisor, Timaru District Council personal correspondence, 28/01/03
38 Carter, Helina, Service Manager, Nikau Deconstruction Engineers, Auckland, personal correspondence, 23/01/03