

Recycling of construction and demolition materials as part of the waste minimization strategy in the Sydney Basin and possible lessons for the Himalayas

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Abstract

The State of New South Wales Government in Australia actively pursues a policy of waste minimization as part of an effort to promote ecologically sustainable development within the state. The waste minimization strategy is developed within a framework in which resource recovery including re-use, reprocessing, recycling and energy recovery are being encouraged. Construction and demolition materials, which is conservatively estimated to constitute about 16% of total waste produced in the Sydney basin is an important target group of waste materials for which recycling is a priority. Most of the construction and demolition waste not recycled ended up in the landfills occupying valuable land not to mention the cost incurred in landfilling. This paper describes an overview of the waste minimization approach taken within NSW, the policies and programs that are put in place to bring about successful outcomes. As a result of a nurturing hand from the government, a recycling industry for construction and demolition materials has developed within the state. This paper also presents an industry perspective of construction and demolition waste recycling based on the results of a survey of the recycling firms in the Sydney area to gauge perception of the current state as well as the future of the industry. Finally, the paper draws from the experience in Sydney and NSW to suggest possible lessons for the Himalayas region.

Introduction

Waste materials are a common problem in modern living. Waste accumulates from a number of sources including domestic, industrial, commercial and construction. These waste materials have to be eventually disposed of in ways that do not endanger human health. In light of this, waste minimization is increasingly seen as an ecologically sustainable strategy for alleviating the need to dispose of waste materials, which is often costly, time and space consuming, and can also have significant detrimental impacts on the natural environment. In Australia, the governments and its organizations have been concerned with developing policies and programs to bring about successful outcomes to waste minimization. This is seen as being essential to reduce the total amount of waste materials going into landfill, especially in the urban areas where land is very scarce. The use of recycled materials is often cheaper for the consumers of the end product, hence there is also an economic justification for promoting its use.

In the state of New South Wales (NSW) and the Sydney basin in particular, industry, commercial and housing development generated by an increasing population and growing economy have helped to sustain an active construction industry. The projected population and economic growths in the state are 1 % and 2.5 % per year respectively (Resource NSW, 2003). This in turn has resulted in the generation of a large volume of construction and demolition waste materials, currently estimated to constitute some 16% of total waste generated (Bakoss and Ravindrarajah, 1999). Within the wider goals of an integrated waste minimization approach, the reduction and recycling for construction and demolition waste is being nurtured and pursued. A number of recycling companies in Sydney basin were surveyed to gain an insight into the current state of the industry, what the industry see as the benefits of recycling, the aspects that can be improved and possible future directions to take for making recycled materials the construction material of choice. The results from the industry survey are presented to provide the reader an insight of the industry perspective. Towards the end of the paper, it then draws upon the NSW and Sydney experience to suggest

possible lessons for the Himalayas, taking into account the different states of socio-economic development of the regions.

Integrated waste minimization approach in NSW Australia

The local and state government in NSW as well as the environmental advocates and community groups are all pushing to reduce the amount of waste going into the landfill in keeping with the goals of waste minimization and ecologically sustainable development within the state. The main aspects of an integrated approach undertaken to nurture and enhance waste minimization, within which reduction and recycling of demolition and construction waste is a major consideration, are highlighted below:

Legislation framework. The legislation framework for an integrated approach to waste minimization was not enacted until 1995. Before then, the state was primarily concerned with the collection, storage and disposal of waste confined mainly to the Sydney region rather than with waste minimization. After the enactment of the Waste Minimisation and Management Act 1995, a statewide legislation framework that identifies and strengthens the pursuance of waste minimization as an integral goal of waste management was realized.

Promotion of best practices for waste minimization.-This is a set of waste minimization principles which is very much in common with the other states in Australia. Namely, waste minimization relies on the three "Rs" - reduce, re-use and recycle and these are well embodied within the Waste Act in terms of a resource management hierarchy as follows (EPA report 2001/44, 2001): Avoiding unnecessary resource consumption, recovering resources (including re-use, reprocessing, recycling and energy recovery), disposal as a last resort. A key target for speeding up the pace of progress in achieving waste minimization is the construction industry where its construction and demolition waste is responsible for contributing as much as 40% of the waste produced in the industry going into landfill.

Waste reduction grants program. The waste reduction grants program, established in 1996, provides grants of up to \$100,000 to businesses, groups of businesses, industry associations, consultants, local councils, community groups, individuals and research organisations. These community-based programs are encouraged as a means to imbue a culture of waste minimization at the grass root level. Generally the aims of the community-based programs are to: increase community knowledge of waste issues, including waste minimisation and management, increase household and community skills in waste minimization, promote and support waste minimisation behaviours, promote positive attitudes towards the environment, promote cooperative action in the community for improving the quality of the local environment

Waste reduction and purchasing policy (WRAPP). In a case of leading by example, the NSW Government's Waste Reduction and Purchasing Policy (WRAPP) requires all state government agencies and state owned corporations to develop and implement a WRAPP plan to reduce waste in four scheduled areas (EPA report 2003/5, 2003): paper products, office equipment and components, vegetation material; and construction and demolition material. The policy requires that priority be given to buying materials with recycled content where they are cost and performance competitive.

Setting waste targets. Above all, the success or otherwise of the strategies and programs are commonly assessed by measuring achieved outcomes against the waste targets. The current and past strategies are working well in terms of achieving a significant reduction in waste in all sectors over the last ten years. Municipal waste has reduced by 40 % and overall waste sectors (including municipal, commercial, industrial, construction and demolition) have reduced by around 25 % since 1993 (Resource NSW, 2003). However, the target set by the Waste Act 1995 of a 60 % reduction was not achieved. It was also found that 75 % of households recycle and 68 % of households are within a council that has a kerbside recycling service in NSW (Resource NSW, 2003).

Demolition and construction waste recycling in Sydney Basin

Policies, strategies and programs instituted in NSW over the last 8 years have helped to nurture a growing recycling industry for construction and demolition waste. As this is a major source of waste added to landfill annually, it can be targeted to help reduce depletion of natural resources and minimize waste being added to landfill. In order to gain information regarding the industry, the authors surveyed the recycling organizations in the Sydney basin. There were a total of 18 recyclers based there at the time of writing that recycle construction and demolition waste. Attempts were made to survey all 18 organizations but only 9

responded. Table 3.1 presents the current type and quantity of recycled materials produced annually in the Sydney basin in 2003. The main materials being recycled are reclaimed asphalt pavements (RAP), concrete, bricks and similar masonry products. A minor group of recyclers questioned also recycle sand, soil, green waste and car tyres. The car tyres are recycled in the form of crumbed rubber. The green waste being recycled comes from the shredding of local trees and vegetation from demolition sites as well as local tree pruning and lopping which is necessary for safety around many local communities. These green waste products are mainly utilised indirectly in the road construction industry in the form of mulch for nature and median strips along roadsides or in highway embankments as a vegetation and rejuvenation medium.

Table 3.1 Materials and Quantities being Recycled by Recycling Plants in Sydney

Materials Recycled	Quantities being recycled (metric tones / yr)
Concrete	726 000
RAP	795 000
Bricks	471 000
Masonry Products	300 000
Soil	41 000
Sands	176 000
Greenwaste	35 000

All organisations responding to the survey agreed that the recycled materials are competitively priced compared to virgin materials. Many of the organisations claim to sell their product at between 30 % and 50 % of the price of virgin materials. Organisations were asked to elaborate on strategies or suggestions to help reduce the production cost of recycled materials. The survey also offered the following possibilities: (a) delivery of cleaner materials into the crushing plant (b) more refined demolition techniques (c) stricter quality control practices, to which 80 % of the respondents agreed to ‘all the above.’ Many of the organisations suggested that stricter quality control practices at the demolition site needed to be enforced. It was pointed out that cleaner raw feeds going into the recycling plant means less time is spent extracting the foreign materials and crushing techniques can be more refined.

Possible lessons for the Himalayas

As home to some of the most pristine environment in the world, the Himalayas would benefit from an integrated plan for waste minimization and recycling of construction and demolition waste, if not immediately then certainly in the future. Sydney and NSW, and the Himalayas are significantly different in terms of the ecology and socio-economic characteristics, and suggestions for the Himalayas should take cognizance of this. Some broad suggestions for waste reduction and recycling for the Himalayas are:

An integrated approach to waste minimization. This covers the various aspects of waste minimization such as legislation framework, waste action plans, waste reduction grants program, setting waste targets outlined in Section 2. A hierarchical approach comprising of the following: avoiding unnecessary resource consumption, recovering resources (including re-use, reprocessing, recycling and energy recovery), disposal as a last resort is advocated. Within each project development, Sydney’s experience shows that the most cost-effective way to achieve waste minimization is through teamwork involving every person from the start of the design stage through to the operations stage of a project.

Legislation framework for integrated approach to waste minimization. Lessons from Sydney and NSW in developing a legislation framework for an integrated approach to waste minimization are mostly relevant to the Himalayas, the main suggestion being to act now rather than later. In a developing Himalayas, construction activities and urbanization are bound to increase in tandem with population and economic growth, with concomitant increase in the generation of waste material. Only 8 years ago, NSW and Sydney did not have an integrated waste minimization approach, and waste minimization and resource recovery did not seem an issue of much concern until it became evident that the prevailing situation was not ecologically sustainable.

A culture of waste minimization and recycling. This trait is not an easy one to develop but it is so essential for sustainable development in the Himalayas. Community-based education programs and a waste grant scheme that provides financial support for them are critical to changing the mindset of the people at the grass root level. The prejudices of recycled materials being inferior to virgin materials will need time and effort to eradicate as is evident in the survey findings in Sydney. A noteworthy point is that there is a significant difference between the waste produced in the Himalayas and in Australia. Nepal for instance generates mainly municipal waste (60.6 % is comprised of organic materials, Dahal,1999), whereas in Australia, a much wider range of waste is being produced, with a much higher percentage, particularly in New South Wales consisting of construction and demolition waste (Bakoss and Ravindrarajah, 1999). Hence the scope of waste that can be reprocessed or recycled in the Himalayas is more limited than in Sydney. It is more likely to be from municipal waste such as green waste, plastics and papers rather than from construction and demolition waste for which the Sydney basin has a special interest in.

A pricing policy to nurture the re-use, reprocessing, recycling and energy recovery. This is to harness the market forces in order to bring about the required changes for waste reduction. If people in the Himalayas could sense the economic benefits from re-use, reprocessing or recycling of waste they will be less likely to go for disposal especially illegal dumping as an option. A carrot and stick approach would be appropriate, where re-used, reprocessed and recycled materials should be made cheaper than virgin materials as an attraction while the cost for landfill disposal or punitive action taken for illegal disposal of waste should act as a deterrent for waste reduction. The pricing policy will have to make adjustments for the socio-economic characteristics of the Himalayas, for example by imposing a heavy penalty for illegal dumping in parallel with Himalayas style community-based education programs.

Set technical standards and appropriate quality control checks. Experience in the Sydney basin suggests that ensuring conformance of the recycled products to proper technical standards and the implementation of appropriate quality control tests are the vital factors necessary to nurture the growth of the recycling industry and it should be no different in the Himalayas. In the Himalayas, however, it may be more difficult to ensure that suppliers did not undercut each other by compromising on the quality standards, which would be detrimental to the recycling industry once confidence of the clients in the recycled products is undermined.

Conclusion

An overview of an integrated waste minimization approach in NSW and Sydney basin as part of an effort to promote ecologically sustainable development is described. The nurturing of a reprocessing and recycling industry in particular is necessary to sustain waste reductions and none is more critical in Sydney than the construction and demolition waste recycling. Although NSW and the Sydney Basin, and the Himalayas are ecologically quite distinct, the authors feel that the lessons learn in one can be applied in the other especially after taking cognizance of the differences in the socio-economic characteristics between the two regions.

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