Industry and Environment is a quarterly review published by the United Nations Environment Programme Division of Technology, Industry and Economics (UNEP DTIE), Tour Mirabeau, 39-43 quai André-Citroën, 75739 Paris Cedex 15, France. Tel: +33 1 44 37 14 50; Fax: +33 1 44 37 14 74; E-mail: unep.tie@unep.fr; http://www.uneptie.org

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Industry and Environment is subject to an annual subscription fee of US$ 60.00. See back cover for order form. Upon application to the Director, submitted on letterhead, the annual subscription charge may be waived for government, educational and non-profit organizations in developing countries which are unable to remit payment.

Industry and Environment is printed on 100% chlorine free paper.

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The building and construction sector: cornerstone of sustainability

In efforts by the global community to achieve real sustainability, probably no industrial sector has as great a potential role as building and construction.

This sector accounts for around one-tenth of the world's GDP, at least 7% of its jobs, half of all resource use, and up to 40% of energy use and greenhouse gas emissions. Moreover, what we call the "built environment" continues to expand, and the rate of resource depletion this involves is not sustainable. As UNEP's *Global Environment Outlook 3* notes, the growth of cities, roads and other infrastructure will entail the disturbance or outright destruction of habitats and wildlife on over 70% of the planet's land surface by 2032 if swift action is not taken now.

Not surprisingly, much of this expansion is occurring in the developing world, driven by population and (in many countries) economic growth. The world population is expected to reach 8 billion by around 2025. Some 98% of the increase will be in developing countries. This trend, combined with ageing of the built environment in the industrialized world, means ever-increasing demand for shelter, factories and other buildings and for infrastructure.

Coming to grips with the building and construction sector and its many economic, environmental and social impacts can seem like wrestling with an octopus. This sector encompasses a whole range of activities, from land use planning, siting and design to the use, management and, ultimately, decommissioning of individual structures. Measures to encourage and increase sustainability must be applied at every stage if the sector as a whole is to achieve sustainability. This is why UNEP and many of its partners have begun to talk about "sustainable building and construction" (SBC) – that is, not just construction activities but the entire process.

The building and construction sector is very broad and its organization is fragmented, not least because of the number of actors. Close cooperation among professionals, decision makers and other stakeholders will be needed to control the sector's environmental and other negative impacts.

On the environmental side alone, in addition to resource depletion, energy consumption and GHG emissions this sector's most critical environmental impacts include waste generation (up to 50% of all waste generated in industrialized countries), water use and water pollution, and emissions of air pollutants (including indoor pollution) along with dust and noise.

On the social side, the dangers to human life and health associated with construction are well known. The effects on communities of design and material choice, land use change and other elements of the building process are increasingly under scrutiny.

The challenges for SBC include the size and fragmented nature of the sector, the need for awareness-raising with respect to developers and clients, the slowness of changes to architecture and engineering curricula and tendering processes, a lack of training programmes and other capacity-building tools, and a financing system too often preoccupied with short-term considerations. Making building and construction sustainable will not be an easy job.

Promising methods and measures are being developed and used at all stages of the process, however. Many of them rely on life-cycle thinking, according to which environmental issues and opportunities are addressed holistically. The idea is to reduce potential environmental damage along the entire life cycle of a product. The "product" in this case may be a highway, an apartment building, a golf course, a shopping mall or a government complex.

Life-cycle approaches are often referred to as "cradle-to-grave" systems. However, for some of the most forward-thinking designers, policy strategists, manufacturers and other actors in this sector, the "cradle-to-grave" concept does not go far enough. Thus they refer to "cradle-to-cradle" design, the "dematerialization" of societies, and "closing the loop" so that building materials, structures, industrial systems and settlements no longer deplete the resource base but rather operate in continual cycles of production, recovery and remanufacture.

Sustainable building

One important tool in applying life-cycle thinking to building and construction is life-cycle assessment, also called life-cycle analysis, which can yield crucial information on material and energy flows. While LCA is difficult to apply to buildings themselves, it comes into its own in the evaluation of building products. It is also increasingly applied in the form of more general analysis of the built environment.

Assessment methods can also be applied to various regulations and standards intended to promote SBC. Most existing laws, regulations and standards in this field will generally lead the industry in the right direction, given sufficient enforcement and other follow-up. However, achieving SBC will require additional action at the policy level. To generate support for a shift towards balanced resource use in this sector, the role of regulations and standards, nationally and internationally, needs more attention.

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Sustainable building

Sustainable Building, an independent journal on building and the environment.

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ISSN 1568-2919

☞ Of basic importance with respect to achieving SBC in the developing world is the development, diffusion, transfer and use of environmentally sound technologies, particularly low-energy technologies such as grey-water recycling systems, passive and active thermal storage and ground-source heat pumps. The successful transfer of such technologies on a wide scale will depend on developed countries setting an example by fostering such activities at home.

In view of the amount of waste generated in the building and construction sector, we need to change the way we think about what happens to buildings and other structures at the end of their useful lives. In most industrial and emerging-industrial countries, the management of building and demolition waste is an economic and environmental problem. To address the "disposal" of buildings in an environmentally friendly or at least a benign manner, alternatives such as dismantling or disassembly (with reuse of recovered materials) need to be considered. Many economic and social benefits can be realized through shifting towards better material recovery practices. Closing the material loop will require efforts at the product design and deconstruction stages.

The social aspects of SBC, especially in a developing country context, make it vital for the building and construction sector to continue moving in the direction of social responsibility. A concerted effort, bringing together representatives of government, employers, workers and other major stakeholders, will be required in order to develop strategies and action plans for improving the implementation of labour standards.

The articles in this double issue of *Industry and Environment* discuss these and other approaches to SBC. This issue was produced jointly with the quarterly magazine *Sustainable Building*. The object of the partnership has been to doubly underline the significance of the built environment in sustainability efforts and the need for awareness-raising, as well as to reinforce the promotion of actions to adopt and implement the SBC concept. To prevent and mitigate the impacts of building and construction, and to move towards a sustainable future, it is imperative for all stakeholders to become aware of the challenges and opportunities involved. A sustainable SBC sector in which profitable businesses thrive is attainable, but this will require active engagement by all stakeholders. It will also require the understanding and acceptance of "new" concepts and terms – in particular, a clear understanding of the need to close material and energy cycles.

To that end, this issue of *Industry and Environment* endeavours to provide a platform for such concepts and to stimulate debate and discussion not only on the need for SBC, but also on some of the possible mechanisms for adopting and applying SBC worldwide.

This issue represents part of UNEP's work to catalyze development of a global strategic plan concerning SBC. The articles provide clear directions for initiatives that could be undertaken by various stakeholders. From policy developers to contractors, from urban planners to architects, and from building managers to recycling firms, joint efforts are needed if the world is to provide decent shelter to its growing population, satisfy the natural desire of communities to prosper economically, and at the same time preserve the planet's resources and minimize climate change.

The role of SBC in the pursuit of sustainable development cannot be underestimated. If current design, construction, operation and demolition methods continue to be used, environmental damage will only worsen. Global population pressures will negate any incremental improvements. A new multidisciplinary paradigm is needed to meet the environmental, social and economic challenges associated with the transition to sustainability. Further development, adoption and implementation of SBC is of paramount importance in this quest.

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