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Industry as a partner for sustainable development

Construction

Confederation of International
Contractors' Associations (CICA)



*Developed through a multi-stakeholder process
facilitated by:*



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Industry as a partner for sustainable development

Construction

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Disclaimer

In a multi-stakeholder consultation facilitated by the United Nations Environment Programme, a number of groups (including representatives from non-governmental organisations, labour unions, research institutes and national governments) provided comments on a preliminary draft of this report prepared by the Confederation of International Contractors' Associations (CICA). The report was then revised, benefiting from stakeholder perspectives and input. The views expressed in the report remain those of the authors, and do not necessarily reflect the views of the United Nations Environment Programme or the individuals and organisations that participated in the consultation.

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CICA is the Confederation of International Contractors' Associations, founded in 1974, which brings together the regional federations from each continent: FIEC for Europe, FIC for Latin America, IFAWPCA for Asia and the Western Pacific, FUSCCA (i.e., AGC-CCA) for North America, FAC for the Middle East, and Africa, and, since 1999, SAFCEC for South Africa. Altogether CICA represents contractors in 78 countries.

This document has been drafted at the request of UNEP DTIE under the responsibility of the President of CICA, Dr. Subba Rao by John Goodall (FIEC Liaison Officer for Environmental Affairs) and CICA Director General, Mme Claude Revel.

Foreword

A significant amount of material has been written and published in recent years about the construction industry and its pursuit of sustainable development. Most of this, however, has been written from a national perspective and comparatively little has been published that addresses this topic from a global standpoint.

The Confederation of International Contractors' Associations (CICA), in drafting this report, has not sought to develop any original material that does not already exist, but rather to present the relevant facts in a manner that responds to the terms of reference laid down by UNEP. Material has therefore been drawn from many sources, but two sources of information have proven particularly relevant and useful:

“Agenda 21 on sustainable construction”

International Council for Research and Innovation in Building and Construction (CIB) Report Publication 237 compiled by Luc Bourdeau with contributions from many others in the construction sector around the world;
and

“International Labour Office Report on Construction” (2001) written by Jill Wells.

CICA wishes to acknowledge these valuable contributions as well as all the others, too numerous to mention, which have made the drafting of this report possible. A list of further reading is contained in the annexes.

Considering the huge number of contractors around the world represented through their federations in CICA, it is simply not feasible for CICA to report on all the experiences and individual efforts in the environmental field, although there are surely many of them. Consequently, we have included some examples in the annexes, such as geographical studies on Mexico, on Asian and Western Pacific countries, United States case studies and the FIEC Charter which expresses the high commitment of European contractors to environmental protection.

The two international declarations signed by CICA in 2001 with UNEP and IFBWW respectively, are also included in the annexes.

Executive summary

The pursuit of sustainable development brings the built environment and the construction industry into sharp relief. This sector of society is of such vital innate importance that most other industrial activities in the world simply fade in comparison. In every country in the world, the built environment normally constitutes more than half of total national capital investment, and construction represents as much as 10% of GNP.

Precise statistics about the size and importance of this sector do not really exist, but it is widely recognised today, with its estimated 111 million employees, as being the world's largest industrial employer, accounting for approximately 28% of all industrial employment.

In many developed countries it accounts for up to half of all the raw materials taken out of the earth's crust by weight, as well as producing a considerable waste stream, although fortunately a significant and growing proportion of this is recycled.

For the most part, construction activities contribute positively to sustainable development. In addition to providing significant opportunities for employment worldwide, one of its fundamental roles is to maintain and improve the quality of the built environment which in turn significantly influences the quality of life of citizens. In fact it is no exaggeration to say that this industry perceives its role as being responsible for continuously improving mankind's physical living conditions. That above all, is its most valuable and enduring contribution to 'sustainable development'.

It also accepts that some types of construction projects are controversial, be they new roads in beautiful countryside or the construction of dams in the developing world. But it is not the

industry that decides what gets built and where. These are matters for local communities and society at large to determine. Once such decisions are taken – and compromises often have to be struck – contractors share the responsibility together with local authorities, designers and consulting engineers to ensure that projects are built in such a way as to minimise environmental impacts. Broadly speaking, this process is what has come to be known as 'sustainable construction'.

In Europe, the built environment accounts for about 40% of energy use rising to as much as 50% in some countries if construction activities (including materials production and transport) are also taken into account. This implies that the built environment (transport in the United States) is the largest single contributor to greenhouse gas emissions. This presents the construction industry with both a challenge and an opportunity.

Significant possibilities exist to reduce emissions from buildings through increased energy-efficiency measures, and in the longer term through the exploitation of renewable energy resources. Many of these technologies already exist, the real challenge lies in convincing owners of existing buildings to undertake the necessary rehabilitation works. Much will also depend on technological advances aimed at reducing the relative costs of renewables.

Renovation and maintenance (R&M) works now constitute an ever-growing share of construction markets, especially in the developed economies. Sustainability infers that demolition has now become the last choice in preference to renovating existing structures whenever feasible. R&M in Europe now represents about one third of all construction activities and in some countries is estimated to

have reached 50% and is still growing. R&M activities are now recognised as an essential element in striving for sustainability in the built environment.

An ongoing task is to raise quality in construction. This is especially true in developing countries. Increasing numbers of construction firms continue to be certified to the ISO 9000 quality management standard and some larger firms to the ISO 14000 environmental management standard. It is none the less recognised that there are logistical limits as to how far this process can go, especially in an industry that is overwhelmingly made up of small and medium-sized enterprises (SMEs).

Another challenge, but certainly not a new one, is to raise the image and profile of the industry. This is especially important if quality new recruits are to be attracted into construction. Significantly, this involves improving health and safety and enhancing training schemes in the sector.

The better management of the construction process, and improved supply chain management in particular, remain important topics. Another more recent aspect of this are the proposals to integrate increasingly environmental and social aspects into public procurement procedures. This is a topic on which the industry has expressed some very strong views.

In terms of future challenges, increased efforts are being made to reduce resource use and lessen the environmental impacts of built facilities and the materials of which they are made. Particular attention is being given to recycling and re-use of waste materials and to the whole-life costing and life cycle analysis of construction projects. Environmental product declarations for construction materials as well as 'environmental labelling' of construction products is being gradually developed, but is still at a preliminary stage.

As for Research and Development (R&D), this is increasingly being focused on sustainability issues. As already stated, the development of renewable energies for applications in buildings is of particular relevance.

Finally, it is recognised that the construction industry needs to develop a set of 'sustainability indices', against which it can benchmark its performance towards increased sustainability. Difficulties persist with obtaining the necessary data and statistics to support these proposals. The construction industry looks forward with confidence to a bright future and is proud of its increasing role in lending mankind a 'big hand' along the road towards sustainability.

Part I: Introduction

The construction industry is generally considered as being the world's largest industrial employer. Estimates of its size and importance necessarily vary from country to country while statistics available are not equally reliable and are not always based on exactly the same criteria. Some figures and statistics are none the less useful, however approximate, in order to have a basic grasp of its size and importance in the world economy:

Total annual output worldwide:

USD3000billion

That is about 10% of GNP of which:

- 30% in Europe,
- 22% United States,
- 21% Japan,
- 4% rest of the developed world,
- 23% developing⁽¹⁾ countries.

Average output per person employed in 1998:

- in developed countries USD79,623,
- in developing countries USD8,507.

Construction accounts for about half of all fixed capital investment.

Employment: 111 million employees⁽²⁾

- 7% of total employment,
- 28% of industrial employment,
- 75% of construction workers are in developing countries,
- typically over 90% of workers are employed in micro firms with less than ten people,
- the construction industry⁽³⁾ has a significant multiplier effect on the economy as a whole and it is considered that one job in construction gives rise to two further jobs⁽⁴⁾ elsewhere in the construction sector and in other parts of the economy. On this basis it can be seen that as much as 20% of all employment may be linked to construction activities in some way.

This explains why construction, perhaps more than any other sector of an economy, is capable of creating employment. Furthermore, governments often use investment in construction as a tool for stabilising economies over the economic cycle. This is an important point, as a lack of stability in construction demand can be very damaging to employment as a whole and confidence in the sector in particular:

The estimated share of developing countries in total world construction activities has increased markedly in recent years, from about 10% in 1965 to about 29% in 1998. These differences between the developed and developing countries are a reflection of global inequality of income as well as in relative levels of productivity. In developed countries comparatively scarce and expensive labour tends to be used more sparingly whereas in the developing countries there is a social need to employ as many people as possible. Furthermore, construction activities in the developed countries tend to exploit increasingly industrialised techniques.

Industry structure

The construction industry consists overwhelmingly of small and medium-sized enterprises (SMEs)⁽⁵⁾, or more accurately 'micro firms'. It is estimated that 97% of all firms are in fact SMEs and that 95% of these are micro firms with ten or fewer employees. Moreover the structure of the industry continues to fragment with consolidation of the larger firms and an ever-increasing number of small firms. Even in big national economies such as France and Germany there are fewer than ten really large national firms having thousands of employees.

(1) According to the World Development Report (2000/2001) developing countries are defined as those with per capita GDP lower than USD 9266

(2) ILO Report 2001 page 5

(3) By 'construction industry' is implied the activities of contractors, whereas 'construction sector' implies all construction-related activities; architects, engineers, materials producers, plant and equipment, facilities managers, etc.

(4) European Commission [COM (97) 593]

(5) SMEs are considered to be those firms having fewer than 500 employees

This evolution is also being reflected in recent developments of the former USSR. As large construction conglomerates formerly under state control are dismantled, they are rapidly being replaced by a multitude of smaller enterprises. Consequently no single firm can be described as dominating the sector either nationally or internationally.

On the other hand it cannot be said that the turnover of the larger firms is tending to fall. The large firms tend increasingly to act as 'project managers', assuming responsibility for the larger contracts in their role as general contractors while outsourcing much of the work to SMEs acting as sub-contractors.

Competition for work in the industry is intense. Because construction activities require comparatively little investment in capital, firms are able to survive on wafer-thin profit margins (2% or even less) and still show an adequate return on capital. On the other hand, construction activities can carry significant risks and small margins of profit can easily turn into significant losses.

Scope of this report

The construction sector is made up of, and served by, many different professions and related industries. The sector includes architects, surveyors, engineers, material suppliers, plant and equipment manufacturers, distributors, as well as contractors with all their different trades and specialists. Moreover, just about everybody may be considered a stakeholder.

In today's society we spend most of our lives in buildings or travelling along roads and railways or through airports which in their entirety constitute what is known as the built environment. The social and environmental impacts of all these activities are of course considerable. Indeed, the very quality of the built environment in large measure determines the living conditions of society.

In drafting this report, a conscious decision has been taken not to cover what is generally described as the 'sector', but rather to concentrate on what is termed the 'industry'. This is justified by the fact that the sector is so large that it is quite unrealistic to attempt to condense it into one quite small report. Moreover, the author of this report, the Confederation of International Contractors' Associations (CICA) exclusively represents the interests of contractors and is therefore not qualified to speak on behalf of other actors and industries working in the sector.

It follows therefore, that this report will begin by identifying the relevant chapters of Agenda 21 as they affect the entire sector, but will limit its scope and analysis to the role of contractors and their interfaces with other actors and stakeholders in the sector.

Agenda 21 and the construction sector

SECTION I: SOCIAL AND ECONOMIC DIMENSIONS

Chapter 3: Combating poverty

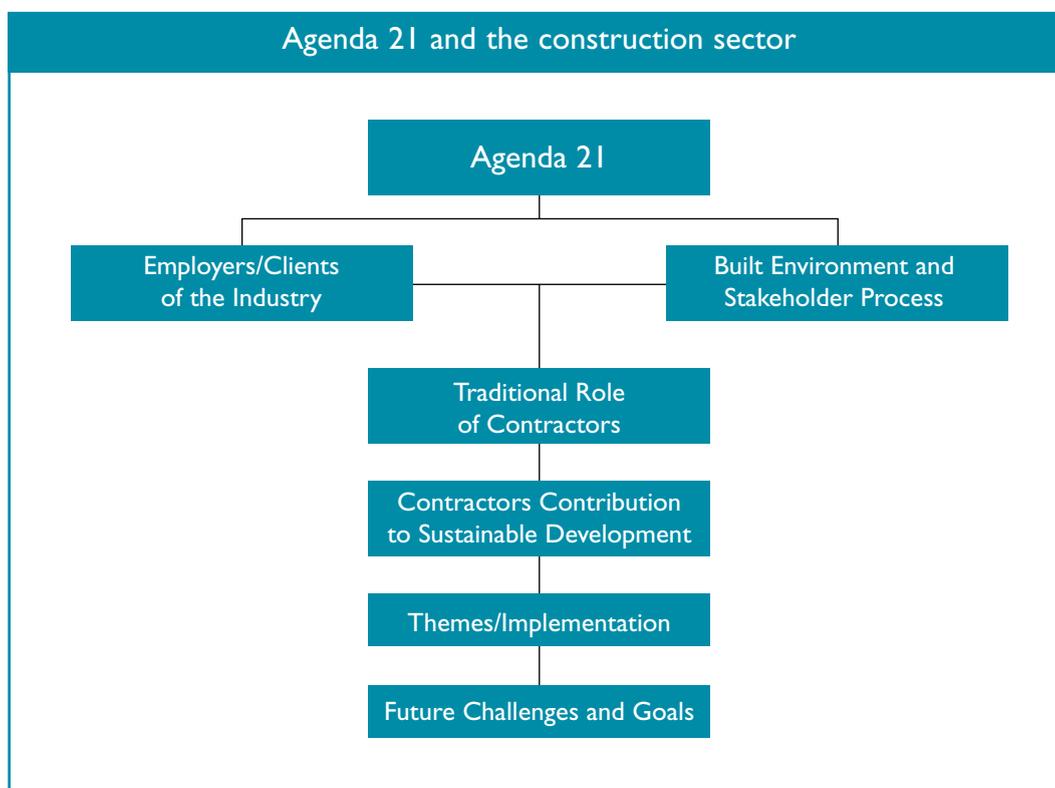
Contractors play a role in generating employment and thus help to combat poverty.

Chapter 4: Changing consumption patterns

Contractors have an interest in promoting energy-efficiency in the built environment, reducing transportation of construction materials and products and minimising waste.

Chapter 6: Promotion and protection of human health

Contractors are involved on a daily basis in reducing health risks from environmental pollution and hazards, as well as with the health and safety of their employees, most particularly on their construction sites. Moreover, when environmental pollution occurs, regardless of how it arises, contractors have an interest in the clean-up and



re-instatement activities. Working with architects and engineers, contractors continue to address the challenges posed by urban and indoor air pollution, noise abatement, water pollution and minimising solid wastes, while raising the quality of human settlements.

Chapter 7: Promoting sustainable human settlement development

The construction and maintenance of the built environment constitutes unquestionably the construction industry's most significant contribution to sustainable development. Indeed, the 'promotion of sustainable construction activities and the provision of shelter, infrastructure and employment' is the essential theme of this report.

Chapter 8: Integration of environment and development in decision-making

Clearly this chapter has implications for the construction industry, but fulfilling these requirements is very much the role of governments, clients and regulatory authorities

in particular. Construction activities are heavily regulated in nearly all countries and the quality and effective implementation of regulations play a crucial role in the manner in which the industry operates. Making "effective use of economic instruments and market and other incentives" is addressed elsewhere in this report.

SECTION II: CONSERVATION AND MANAGEMENT OF RESOURCES FOR DEVELOPMENT

Chapter 9: Protection of the atmosphere

The construction industry promotes and plays a vital role in carrying out works aimed at raising the energy efficiency of the built environment. In Europe at least, the built environment consumes more energy – and accounts for more greenhouse gas emissions – than any other sector. At the same time it offers considerable scope for emissions reduction.

Chapter 10: Integrated approach to the planning and management of land resources

The use of land for human settlement and transport infrastructure has become a controversial issue in many developed countries today. The construction industry, itself a stakeholder, fully endorses measures aimed at preserving the countryside. Nevertheless, a balance must be struck between stakeholders' concerns about the countryside and mankind's needs for settlement and transportation infrastructure. These are essentially political issues in the hands of governments and politicians.

Chapter 19: Environmentally sound management of toxic chemicals and dangerous products

A limited number of potentially dangerous products such as certain adhesives, paints, lacquers and wood treatments are in widespread use in the construction industry as well as refrigerant liquids for air-conditioning systems. Many of these are applied at the stage of product manufacture. When used on construction sites they are normally subject to health and safety regulations.

Chapter 20: Environmentally sound management of hazardous wastes

In practice, the construction industry is comparatively little concerned with hazardous wastes. The notable exceptions are asbestos, especially fibrous asbestos and contaminated land in certain urban and industrial areas.

Chapter 21: Environmentally sound management of solid wastes and sewage-related issues

'Minimising wastes'; 'maximising and promoting environmentally-sound waste reuse and recycling' are matters of great concern to the construction industry. Construction and demolition activities produce prodigious quantities of waste, increasing amounts of which are now recycled or reused in many countries.

SECTION III: STRENGTHENING THE ROLE OF MAJOR GROUPS**Chapter 24: Global action for women towards sustainable and equitable development**

Contractors actively promote the employment of women in construction. However, a majority of women appear to consider a career on a construction site as being 'unattractive'. Given that construction activities sometimes call for physical strength and are often carried out in inhospitable climatic conditions, this is not really surprising. Nevertheless, many women are increasingly employed as architects, engineers or in administrative roles.

Chapter 25: Children and youth in sustainable development

Successfully managed vocational training programmes and the involvement of youth through attracting able recruits, is central to the success of a sustainable construction industry.

Chapter 29: Strengthening the role of workers and their trade unions

A safe, clean and healthy working environment is an essential element of a sustainable construction industry and to attracting new recruits into the sector. In many countries, the industry positively encourages, and participates in, a 'social dialogue' with the construction trade unions. The essential purpose of the dialogue is to promote improved working conditions in the industry, better training, as well as aiming for sustainable employment.

Chapter 30: Strengthening the roles of business and industry

In terms of promoting cleaner production, CICA is a signatory of UNEP's 'Declaration of cleaner production'. In terms of 'Promoting responsible entrepreneurship', considerable efforts, many of them crowned with success, have been made in recent years to increase the efficiency of resource utilisation, recycling of waste and indeed in reducing the quantity of waste discharge per unit of economic output.

SECTION IV: MEANS OF IMPLEMENTATION

Chapter 33: Financial resources and mechanisms

The construction industry plays a major role in constructing major items of infrastructure in developing countries financed by international agencies and funding organisations. In so doing, employment opportunities for the indigenous population are offered and opportunities arise for training and transfer of technological knowledge and skills. It must be stressed, however, that the construction industry plays no role in deciding what infrastructure should be built or where. This is a matter for decision by governments and the funding agencies.

Chapter 34: Transfer of environmentally-sound technology, co-operation and capacity building

Contractors originating in developed countries and working in developing countries have every interest in employing and training the indigenous labour force, which is almost always a more economical solution than importing scarce labour from developed countries. As concerns the transfer of state-of-the-art technologies, this is rather more controversial as these technologies are usually designed to make the process more capital, rather than labour-intensive. Such solutions are not invariably appropriate in developing countries that are looking to absorb a large workforce.

Chapter 36: Promoting education, public awareness and training

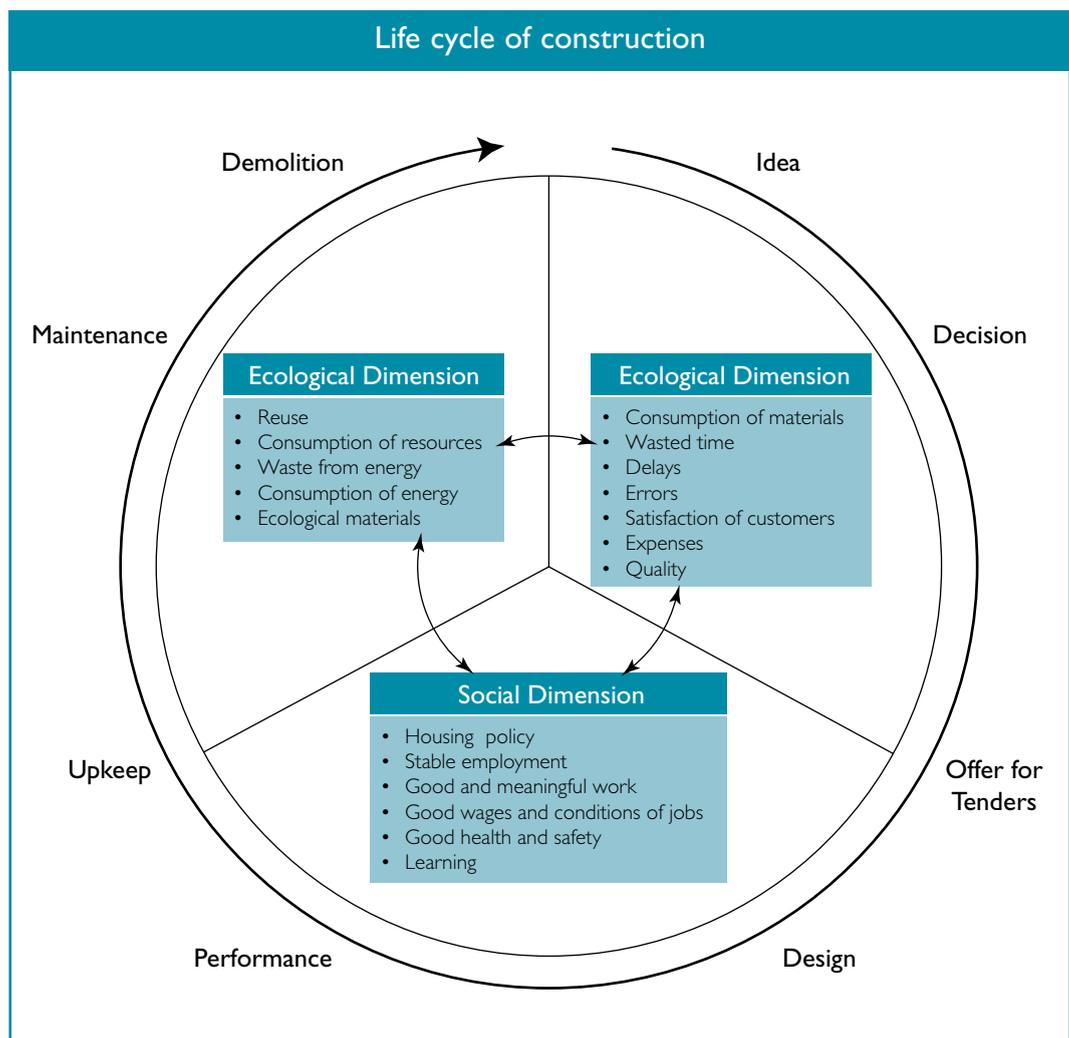
Promoting public awareness of issues which concern the construction industry is an ongoing process. Promoting and raising the image of the sector is one example, while stressing the importance of energy-efficiency measures in the built environment is another. Vocational training programmes, as mentioned above, are an ongoing challenge, vital to the success of a sustainable construction industry.

Some of the principal sustainability issues affecting the construction sector

The ways in which built structures are procured and erected, used and operated, maintained and repaired, modernised and rehabilitated, and finally dismantled (and reused) or demolished (and recycled), constitute the complete cycle of sustainable construction activities. Building products should, as far as possible, be reusable and materials recyclable. Design for long service life (and durability) is superior to design for

reusability. Reusability is superior to recycling, and recycling is superior to waste disposal.

It is unrealistic to suppose that it is even possible to draw up an exhaustive list of all issues⁽⁶⁾ which impact, one way or another, on the sustainability of construction activities and the built environment. There are quite simply too many variables in an environment that is in a state of continuous change and evolution. Moreover, it seems superfluous to identify issues that have only a marginal impact on sustainability or indeed those that cannot realistically be addressed.



(6) For a more exhaustive list refer to BRE Digest 446 dated May 2000 ISBN 186081 398 4

The following is a suggested list of the principal environmental issues:

Issue	Brief rationale
Environmentally-friendly construction materials	As much as 50% of all materials extracted from the earth's crust are transformed into construction materials and products. Including energy in use, when installed in a building, they account for as much as 40% of all energy use. Moreover, these same materials when they enter the waste stream, account for some 50% of all waste generated prior to recycling or recovery or final disposal.
Energy efficiency in buildings	In developed economies, the construction, operation and subsequent demolition of built facilities account for about 40% of all energy end-use and a similar percentage of greenhouse gas emissions. In Europe, moreover, the potential for reducing greenhouse gas emissions in existing and new buildings is greater than that of any other sector, and consequently represents the most significant objective for reducing emissions in order to reach the targets laid down in the Kyoto Protocol.
Construction and demolition waste management	Construction and demolition waste constitutes the largest waste stream by weight in the EU. Disposing of these waste materials is presenting increased difficulties in many parts of the world. Increased emphasis needs to be placed on waste minimisation, reuse and recycling.
Water conservation	The operation of buildings places a strain on raw water reserves, while waste water and sewage needs to be treated before being returned to watercourses. Ways of conserving water and more efficient and effective means of treating wastewater need to be developed taking better account of land use planning for such facilities.
Health in buildings	The quality of the internal environment of a building is an essential element to the health of its occupants. Problems caused by damp and mould can be avoided through good building practices. Bio-climatic considerations and good ventilation can also reduce or even eliminate the need for air-conditioning in the summer months while reducing the amount of energy required for heating in the winter.

Issue	Brief rationale
Building-related transport aspects	Studies ⁽⁷⁾ have demonstrated that relatively compact towns and cities well-served by public transport systems are appreciably more energy-efficient than cities that have a relatively low urban density (often referred to as 'urban sprawl'). For as long as modern civilisation continues to rely on the combustion of fossil fuels as its principal source of transport energy, there will be an ongoing environmental imperative to construct buildings to relatively high densities, served by efficient public transport systems.
Urban sustainability	While construction activities and the operation of built facilities are only one of many aspects linked to urban sustainability, the quality and efficient operation of buildings and infrastructure are of fundamental importance.
Sustainable architecture	<p>There is a lot that can be done to improve the overall performance of buildings, by implementing principles and measures in the design process, leading to 'sustainable architecture'⁽⁸⁾. 'Sustainable architecture' relies on the continuous dialogue and close co-operation among all involved in the design and construction process, in order to improve the sustainable quality of every building.</p> <p>Moreover, 'sustainable architecture' must be considered in the context of a holistic and integrated approach to the overall quality of the built environment, in particular in the urban context.⁽⁹⁾</p>
Societal impacts arising from construction activities and the built environment	How more sustainable construction can improve the living context and the relationship between citizens and their environment whether rural or urban, and contribute effectively towards social cohesion, job creation and regional economic development.

(7) Transport and Buildings; the environmental impact, ISBN 1 86081 322 4

(8) A Green Vitruvius, Principles and Practice of Sustainable Architecture Design, 1999, James & James Ltd., London, ISBN N. 1-873936-9

(9) Resolution of the Council of the European Union, 12 February 2001, JOCE (2001/C 73/04)

Part 2: Implementation of the three dimensions of sustainable development

The contractors' contribution to sustainable development

Just like any other economic entity operating in a market economy, it is the role of a contractor to respond to the demands of the market. In most economies, construction markets are divided fairly equally between the private and public sectors. Public markets are essentially influenced by the needs of the community (schools, hospitals, roads, police stations and the like), whereas private sector demand is influenced by the needs of corporations (factories, offices, supermarkets etc.) and individuals (dwellings).

When it comes to deciding what gets built and where, it is not the contractors who decide, but overwhelmingly public and private organisations which in turn are all responding to the demands of the community as a whole. One way or another everyone can be described as a 'stakeholder' in the process.

So far as contractors are concerned, their role rarely goes beyond carrying out instructions given by their clients and appointed representatives. Exceptions to this reality are few, although one example is when contractors play the dual role of 'developers and contractors', such as speculative house builders. But here again, through the planning process, real estate development is strictly regulated, not by the developers but by the authorities. Nowhere is the contradiction between 'needs' on the one hand and 'inconvenience' on the other more pronounced than, for example, the construction of a road through an area of outstanding natural beauty. Eventually compromises have to be made.

So, to what extent can a contractor contribute to sustainable development? There are a number of ways:

- as an important employer of labour through his 'respect for people';
- through the rationalisation of resource use (within the constraints of the client's specification);
- ecologically through waste minimisation, separation and re-cycling;
- by promoting improved relationships with his suppliers and sub-contractors and the local community;
- through the abatement of noise, dust and the general inconvenience caused to the local community by his activities.

Social dimension: People in construction

Construction is often described as a 'people business'. It is sometimes said that construction is a job which can be done without much schooling. That may be true for simple labouring jobs, but this is an unsustainable approach. While some contractors may still believe that 'cheap labour' makes for 'cheap buildings', all the evidence points in the opposite direction.

Contractors operating in developing economies will tend to hire lots of 'cheap labour'. This can be justified on social grounds in areas of high unemployment, but 'cheap labour' tends to be 'uneducated labour' and is therefore relatively unproductive. 'Expensive labour' on the other hand must be productive to justify its relatively high price. It is therefore used sparingly accompanied by a maximum of mechanisation.

In this sense, the essential difference between 'developing' and 'developed' economies is 'education and training' and the corresponding degree of mechanisation. Moreover, construction has the ability to 'absorb the excluded' and this is especially important in developing countries. In terms of a practical example, it may be cheaper in a developing country to hire large numbers of labourers, arm them with simple hammers and have them break up large boulders into small pieces in order to make hardcore for a road base. In developed countries it makes far more economic sense to feed such material through a crusher.

It goes without saying, that attracting and retaining the loyalty and services of a dedicated and skilled workforce is essential to carrying on a successful contracting business. Providing regular employment on a continuous basis on varying and mobile construction sites is anything but simple. Add in the difficulties arising from inclement weather; further exacerbated by unpredictable economic cycles and the difficulties become quite apparent.

Of course, this is nothing new, but the relentless increase in pressure on margins tends to increase the difficulties. There have been growing tendencies in some countries at least, for skilled workmen to work on a self-employed basis, operating either independently or through what are termed 'labour only sub-contractors' or 'employment agencies'. This phenomenon has advantages both for the contractors and the workers; labour can be hired short-term, on a project-by-project basis and at least part of the responsibility for supervision delegated to the sub-contractor; while many craftsmen appreciate the opportunity of working independently.

The often-cited disadvantages are that coherent teams of workers are not formed and the time-honoured systems of training through apprenticeship increasingly break down. Moreover, this perception of the industry can

seriously damage its image and reputation and discourage new recruits from joining or remaining in the industry. In the United Kingdom, where this tendency has been especially pronounced, the number of self-employed people has been reduced from 45% in 1995 to 36% of total employment in the industry in 2000.⁽¹⁰⁾

This has also led to increased fragmentation in the industry, with the larger firms employing less and less labour on construction sites in favour of parceling out work on a sub-contracted basis. Furthermore, contractors increasingly set up temporary joint ventures on a project-by-project basis. Nevertheless, training of the construction workforce is central to the success of any national construction industry. There are many good examples of what can be achieved⁽¹¹⁾.

The relationship between the unions and the employers is important to the industry. The so-called 'social dialogue' is carried on at all levels both nationally and internationally. An essential aim is to support and promote collective bargaining and collective rights.

Improving health and safety on construction sites is another area of ongoing concern to contractors, their employees and government authorities responsible for the welfare of workers. It is no secret that construction can be a dangerous activity. Many countries have made it compulsory for operatives to wear safety gear such as hard hats and safety shoes and many contractors already go beyond their legal obligations in this regard. It remains largely up to contractors to see that the regulations are enforced.

Accidents that occur on construction sites tend to attract far more attention than does ill health. Accidents happen suddenly, whereas illnesses occur only slowly. In the United Kingdom, for example, far more construction workers die or fall ill as a result of poor occupational health risk management than are

(10) "Rethinking Construction"
- A Commitment to People
"Our Biggest Asset"

(11) The "Leonardo programme": a European example.

(12) "Rethinking Construction"
- A Commitment to People
"Our Biggest Asset"

killed or injured in accidents. British statistics⁽¹²⁾ give some indication of the scale of the problem. Recent figures indicate that among construction workers, 600 die annually due to asbestos-related diseases; 40% of all operatives suffer muscular-skeletal problems, while 30% suffer from dermatitis from contact with cement.

The situation on construction sites in developing countries tends to be somewhat less satisfactory. The more intense use of labour increases the possibility of accidents occurring, while the indigenous labour force tends to be less aware of the potential dangers and is less well supervised. In most countries, construction site jobs are taken almost exclusively by men, but in the countries of South Asia for example, women play an important role which usually consists of performing unskilled tasks. For example in India it is estimated that up to 30% of the construction workforce is comprised of women.

There is a direct link between the level of employment in society on the one hand and social ills such as poverty, crime, lack of social cohesion, extensive social exclusion and the like on the other. Training and employment in construction serve to mitigate these ills, while simultaneously offering the possibility of improving the living conditions of the population at large, as well as the quality of the built environment.

Skills shortages make it difficult for contractors to deliver the quality of products that more discerning customers require. This is an obvious problem in many developed countries and a growing one in developing ones, particularly those with significant populations of middle and upper class clients.

Foreign contractors operating in developing countries, on the other hand, usually do their utmost to abide by western standards of health, hygiene and security, and this often calls for an increased level of supervision. Children

are not employed while women, if employed, stand a better chance of being treated equitably.

The presence of foreign contractors in developing countries does provide real opportunities for the indigenous population to find employment, learn new skills and reap the benefits of the provision of new infrastructure and built facilities. Rather less satisfactory is the reality that such activities tend to be short-lived; construction sites are forever on the move.

CICA subscribes to the UN Secretary-General's 'Global Compact' and intends that it be respected, through its member federations, on a worldwide basis. Moreover, at the beginning of 2001, the International Federation of Building and Woodworkers (IFBWW) together with CICA, urged the World Bank to ensure that all projects that are funded by the World Bank respect the fundamental International Labour Organisation (ILO) Conventions. This is one example of how social sustainability can be developed and these important 'messages' communicated throughout the industry.

As a conclusion on social aspects, one should underline the high involvement of CICA in the dialogue with ILO and the unions, particularly (but not exclusively) demonstrated by:

- the signature of an agreement with the IFBWW in March 2001,
- the active participation in discussions with ILO (quadripartite meeting with the World Bank), ILO, IFBWW in Geneva in March 2001) and the Tripartite meeting employers/workers/governments in the ILO premises in December 2001,
- the active promotion to increase continuous training by all CICA members among their own member companies.

Economic dimension

Construction procurement issues

In terms of policy, one of CICA's main goals is to promote enhanced environmental values and sustainability in construction. CICA, representing contractors all over the world, must shoulder its share of responsibility for protecting and upgrading the environment today for the benefit of future generations through promoting sustainable construction.

Environment and sustainability are subject to diverse interpretations depending on cultures, living conditions, etc. That is the reason why, in the context of international bidding, CICA strongly advocates that the international financing institutions (IFIs), contribute to setting up objective criteria. This is in order to ensure both a level playing field, and ensuring that procurement procedures do not deviate from their essential purpose, namely that of identifying the most advantageous tender:

Environmental requirements should be clearly stated in the bid documents and should not constitute arbitrary elements for interpretation during the award procedure. Moreover, the procedure to be applied in evaluating tenders should also be clearly stated in the bid documents. There is always the possibility of inviting bidders to put forward alternative offers incorporating more environmentally attractive solutions, but usually such alternatives are more expensive, at least initially.

In the 2000 meeting between CICA and the World Bank, a consensus was reached on the principle of establishing a list of materials which should be banned from use in contracts financed by the WB. CICA remains ready to discuss this matter further with the IFIs.

It should also be emphasised that, whenever and wherever they work, the activities of contractors are subject to legal frameworks, thus their responsibility should always be seen in that light. In the same manner, it is pertinent

to mention the existing model standard forms of contract in widespread international use, such as those published by FIDIC (Fédération Internationale des Ingénieurs Conseils). These are widely used by a majority of contracting authorities, especially when international tenders are invited in developing countries, and in which the role of the contractor is normally limited to the simple execution of the works.

International investment aspects

The provision of infrastructure is recognised as being essential for economic development. In industrialised countries, the provision and maintenance of high-quality infrastructure is now undoubtedly one of the necessary conditions, not just for sustainable growth but also for the well-being of citizens. Likewise, if developing countries are to achieve and maintain sustainable growth patterns, the financing of the construction of infrastructure is absolutely vital.

Over the years, it has become increasingly apparent that it is beyond the means of most countries, developed or developing, to finance all such projects out of taxation. There are various reasons for this including:

- The preservation of public resources: public deficits and national debts must be reduced or at least constrained, particularly through redirecting spending in favour of the state's core responsibilities. Delegating the management of some infrastructure projects to competent organisations in the private sector can free up public resources for other needs, which only the public authority can address.
- Management efficiency: within a framework regulated by the state or the public authority, bringing in competent professionals can help optimise management. Most bilateral and multilateral development organisations are moving in this direction, even for services other than infrastructure.

However, it is just as clear for public authorities, private operators and multilateral organisations that leaving everything in the hands of the private sector is not a realistic solution either. Project financing techniques have served their purpose for projects that call for socio-economic utility. Quality public services require that the state or public authority maintain its responsibility and supervisory role. This is not a question of ideology, but rather a simple reality, based on the present financial situation prevailing in developing, industrialised and emerging countries.

Public private partnerships (PPPs) appear today to be much more than a simple budget tool, but rather a real instrument for collaborative development, and an operational contribution to socio-economic growth in general. When properly conceived from the outset, PPPs optimise the satisfaction of the three fundamental actors involved (ie, the state/public authority, citizens/consumers and private operators).

Infrastructure needs are now greater than ever, both in emerging and developing countries and have been estimated at about USD2000 billion over the next 15 years. In industrialised countries the needs are perhaps less, but nonetheless significant budgets remain to be funded (in Europe for example, an amount of about 50 billion still needs to be found over the next ten years, for the European transport networks alone).

In order to ensure a proper development by means of PPPs, the state must have the necessary authority to establish a balanced, stable and clear framework, with legal rules and an adequate financing system. It needs to set strict goals for the private sector, with which it can share the profits generated by such projects, according to the initial agreements, while it can also apply sanctions if goals are not met.

The resources for financing private sector contributions may be found today in financial markets, and for emerging countries, with the help of the multilateral organisations, through securitisation of the future flows of socio-economic benefits generated by these projects.

The role of institutions, agencies, and international and multilateral organisations, is fundamental in this field from a triple point of view. Their 'capacity building' action is essential in helping to establish complete, clear, adapted, stable but flexible and safe institutional systems, that provide security for foreign and local private investments. Their consulting role helps identify, validate and prioritise projects. They fulfil an essential function, which should be developed, namely that of an indirect support for project financing, through providing financial and political risk guarantee mechanisms.

Ethics

Our general understanding concerning problems relating to ethics is quite simple: CICA strongly refutes any unethical conduct. But CICA's considerations should not concentrate on the investigation process, which comes at the end. The main question lies with the control of procedures by the International Financing Institutions (IFIs), principally the World Bank, from the beginning to the end. The main goal is to properly structure the selection and contract award procedures, and this on the basis of a carefully compiled short-list of bidders.

Another method to improve matters is to set up a rigid structure of payments. At the highest level, CICA strongly supports the UNO current initiative and preparatory discussions aimed at combating corruption, through the enlargement of the binding OECD Convention already existing from 1998 to 1999.

Ethical conduct, together with environmental concerns, is part of the contracting process, and these considerations should be developed early in the procedures. Technical and legal tools, such as the monitoring of payments or contract bonds, should be studied in that light.

The new policies of the IFIs and other international organisations should help in achieving all these goals, as they are less and less focused on financing but more and more on 'capacity building' in the developing countries, i.e. supporting and training them in order to set up relevant legal systems.

Environmental dimension

Construction products and materials

The construction industry is a large consumer of energy-intensive manufactured materials such as iron, steel and cement for structural elements, glass for windows, and synthetic materials for sealing and insulation.

The environmental issues directly related to the production of these materials are, of course, matters for the industries that produce them. With the exception of certain products such as cement, they are generally not specific to construction. However, through the large-scale use of materials, construction is contributing to the depletion of non-renewable resources.

As far as the manufacture of products is concerned, the significant issues are:

- reducing the embodied amount of material and energy of the products (renewable raw materials, low-energy recycling, increasing durability and technical life expectancy);
- low emissions from products in use (environmentally-friendly coatings, pre-treatment);
- repairability (design for disassembly and repair in the factory) and recyclability (used products to be returned to their producer; product stewardship).

It is important that life cycle approaches to improving environmental performances are adopted not only for products, but for construction works as well. Construction products cannot be assessed on a stand-alone basis. This is because construction works with the highest 'green' credentials may use products that might have relatively high environmental loads, but that will significantly contribute to reducing a building's environmental impact throughout its lifetime. Construction products need to be viewed in terms of functional units, how they perform throughout the lifetime of the construction works in which they are installed, and what happens to them when deconstruction or demolition takes place.

The construction materials industry is now looking at ways in which it can adopt a life cycle approach to improving the environmental performance of its products. It foresees that this can best be achieved through (where feasible), a non-regulatory 'integrated product policy' approach that is flexible, pragmatic, and based on industry initiatives and voluntary agreements. It also anticipates that life cycle inventory-based environmental data schemes should become general practice for the industry.

Through a voluntary system of 'environmental product declarations', these initiatives are expected to facilitate the task of specification writers, owners and builders, in selecting materials according to their life cycle impact on the environment.

Energy efficiency in buildings

Energy use, which is the basic driving force behind climate change and a number of air pollution problems, remains at a consistently high level all over the world. Greater efficiency in the production and use of energy is a key requirement for a more sustainable energy policy. Relatively low energy prices have been counter-productive in generating sufficient stimulus for energy-efficiency improvements to

be adequately implemented in many countries such as in western Europe, where currently energy intensity is improving by less than 1% per year; while GDP is continuing to grow by about 2% to 3% per year.

Considerable scope exists for further improvement in energy-efficiency, particularly in the transport and household sectors.

Although the figure differs from country to country, buildings use between about 30% and 40% of total energy directly, but if the indirect use is included the proportion is closer to 50%. Whereas in the United States, transport is the single largest source of greenhouse gas (GHG) emissions, in Europe the built environment is.

Demand-side measures in the building sector have been drawn up over several years in many developed countries. However, the main focus has been on the rational use of energy in new buildings. This has largely been achieved through up-grading the existing regulations relating to the insulation of new buildings. The potential for energy-saving within the existing building stock is much more important and much more difficult to achieve except over the long-term. In Europe, it has been estimated that the potential exists to reduce emissions from buildings by at least 30%. This would be more than enough to enable the EU to meet its Kyoto target of an 8% reduction between 2008 and 2012. Unfortunately, this highly desirable objective is unlikely to be met.

The construction industry for its part continues to apply relentless pressure on the European institutions and national governments to make greater efforts towards this objective. As far as contractors are concerned, the promotion of energy-efficiency in the existing building stock is a 'win-win' opportunity. In Europe alone, it has been estimated that to achieve a reduction of 20% in GHG emissions would give rise to an additional 300,000 permanent jobs in

construction over a period of ten years. There is a need for new retrofit technologies that are economically affordable to building owners. In the developing countries, there should be a similar thrust where space-heating or air-conditioning is used in buildings.

The construction industry believes energy-efficiency measures must take precedence over renewable energies. The latter are almost always more expensive than burning fossil fuels and the first priority must be to inhibit the waste of all forms of energy. Moreover, the use of renewable energies in most countries (except for hydro-electricity) has yet to advance beyond the research stage or to be made available at competitive prices. However, there have been some notable successes in recent years and generally speaking, the only impediment to their wider use are economic constraints.

Waste

Significant and successful efforts have been made in recent years to recycle and reuse an increasing proportion of construction and demolition waste as aggregates in road construction for sub-base layers and in concrete. In several countries, 85% is recycled in this way and construction waste has emerged as a larger waste stream than demolition waste when most of the latter can be recycled. The demolition process and the upgrading of the outcoming waste have to be executed in such a way as not to pollute the recycled aggregates with, for example, asbestos or heavy metals.

Efforts are now concentrated on measures to promote waste minimisation, as well as measures to reduce the amount of waste going to landfills and illegal dumping sites. As an illustration of current thinking and strategies, it is pertinent to reproduce some of the recommendations proposed by a tripartite EU working group (made up of representatives of industry, national public administrations and the European

Commission) in 2000:

- Designers and material producers should develop policies with regard to prevention, for example:
 - waste-prevention-oriented planning and design,
 - recovery-oriented construction,
 - qualitative prevention,
 - design for multiple uses.
- Contractors and all members of the supply chain should implement education and training within their organisations, aimed at improving waste management practices, for example:
 - place increased emphasis on good site management in order to prevent damage to materials being off-loaded and stored,
 - the accurate ordering of materials.
- Promoters and contractors should develop codes of practice at national level to include:
 - selective demolition and/or waste segregation,
 - no mixing of hazardous with non-hazardous waste, including separate storage and collection,
 - avoidance of contamination.
- Construction specifications should give preference to:
 - recyclable primary materials and products,
 - construction and demolition-derived materials meeting all relevant technical requirements.
- Promoters and contractors should be encouraged to prepare Environmental Management Plans (EMPs) leading to ISO 14001 certification.
- A project EMP should take into account Life Cycle Analysis (LCA) and the eventual disposal of the construction works. The project EMP should cover the entire construction process, being added to at each level by the design team, the builder and the demolition contractor, etc.

New 'sustainable construction' markets

In the developing world, construction needs to relate principally the provision of new infrastructure, housing, schools, hospitals, roads, etc. In the developed world, the balance of activities is quite rapidly moving from new construction to renovation and maintenance (R&M) work. In fact R&M typically accounts for one third of all construction activity in Europe. Some countries estimate that it already accounts for as much as 50% of total activity and is still rising.

In many respects, this tendency represents a positive trend for the environment and for employment. It is increasingly being recognised that from an environmental point of view, a policy of demolishing structures should only be applied as a last resort. In fact, it is far preferable to upgrade and refurbish existing structures, especially in terms of improving energy efficiency. Furthermore, studies show that the most economical method of introducing energy-saving measures into a building is when it undergoes total renovation.

In this regard, in Europe at least, new legislation is expected to be introduced which will require building owners, when renovating at least 25% (measured by floor area of an existing building) to upgrade – for energy-efficiency purposes – the entire structure to current regulatory requirements.

R&M work is labour-intensive. Furthermore, it calls for numerous skills and preferably the multi-skilling of operatives. Consequently, the continuing growth in this sub-sector of the industry is creating increased employment opportunities and increased training requirements. In this manner, the construction industry serves to:

- raise the quality of the built environment;
- protect and enhance the national heritage;
- reduce environmental impacts, particularly as concerns GHG emissions;
- create worthwhile jobs;
- promote social cohesion;
- encourage youth to appreciate the value of buildings and how to respect and maintain them.

This is the construction industry's really positive contribution to 'sustainable development' in economic, social and ecological terms. Moreover, it gives credence to the reality that the construction industry plays a really vital role in pursuing the ideals and objectives of 'sustainable development'.

To further promote such activities, some EU countries are now taking part in an experiment through which such activities carry a lower rate of value added tax (say 5% instead of 21%). It is hoped that this experiment will demonstrate that governments can safely lower the VAT rate on R&M work without compromising tax revenues, the difference being made up by increased construction turnover and proper declarations being made by workmen operating in the so-called 'informal sector'.

In the developing world, environmental issues are rather different. The real issue here is to raise quality in construction that in many respects is linked to the far wider issues of educating the population and promoting investment. On the other hand it should be possible to 'build it right first time' and not make the same mistakes as were made in the developed countries in the 19th and early 20th centuries, namely to construct buildings without any serious consideration of energy-efficiency measures. Developing countries, just like developed countries, need effective regulations and more difficult still, national administrations need to ensure that they are enforced.

Part 3: Means of implementation

This report has, to a large extent, already explained what is being done in the construction industry towards enhancing sustainability.

There can be no doubt that the introduction of Agenda 21 in 1992 has led to a change of emphasis, even a new paradigm. Above all there is much greater awareness of sustainability issues, most particularly the threat of climate change and the need to take new initiatives to reduce GHG emissions. This new paradigm, as far as the construction industry is concerned, has come to be known as 'sustainable construction'. In fact, in recent years it has become an extremely popular topic for seminars, international conferences and workshops.

Sustainability issues are now being 'integrated' in just about every conceivable manner from procurement to R&D. One might say that what is not 'sustainable' is not 'acceptable'. Nevertheless, achieving these lofty objectives is easier said than done.

Government and public administrations play a significant role. Apart from being responsible for devising, implementing and enforcing the necessary regulatory measures (construction activities tend to be heavily regulated in most countries), they are also responsible for deciding what gets built and where it is built; not just where public works are concerned but private developments as well. The links therefore, between 'striving for sustainability' on the one hand, and 'efficient regulation and enforcement' on the other, cannot be over-emphasised.

Certification schemes continue to attract many adherents in a large number of countries, especially the quality management standard, ISO 9000. The same cannot be said of the environmental management standard ISO 14000, where take-up has been much slower, but it continues to spread, particularly among larger firms. In any event, the extent of take-up of these standards can eventually expect to hit a 'glass ceiling'. Construction is an industry of SMEs or more particularly 'micro firms'. If all these firms were to seek certification a whole army of certifiers would be required. Clearly, this is unrealistic.

'Life cycle analysis' and 'life cycle costing' are still relatively new concepts in construction but are gaining in importance. This is discussed in more detail in the next chapter as is the 'environmental labelling' of construction products.

As far as corporate reporting is concerned, this has been practised for many years by numerous larger firms. The practice is expected to become more widespread as environmental and social aspects grow in importance. Voluntary corporate initiatives, such as the framework agreements recently signed between IFBWW and certain leading construction firms constitute a real achievement for the industry. These initiatives serve to further underline the industry's commitment to participating in the UN Secretary General's 'Global Compact' for socially responsible business.

Strong links have been set up between 'research and development' and 'sustainability'. Among researchers, there is widespread recognition that almost all research initiatives include sustainability themes. Indeed, in publicly-funded research programmes, improving sustainability is often a criterion linked to funding.

Part 4: Future challenges and goals

As has already been stated, there is no doubt that Agenda 21 has begun to have a pronounced effect on the construction industry. In recent years it has become markedly more conscious of its responsibilities and the role it must play in striving towards more sustainable development. Most significantly it is uniquely placed, and looks forward with confidence to making a major contribution. But the task has only just begun, and by all accounts the road is a long one. Indeed, the concept of striving for sustainable development is not so much a 'destination' at the end of a road but like life, more a 'manner of travelling'.

In looking at the future challenges and goals for this enormous industry, it is perhaps helpful to address them in terms of the three pillars of sustainable development, and then complete this dialogue with some conclusions.

Social aspects

As the world's largest industrial employer, social issues always have been and always will be the industry's greatest challenge. It is often held that mankind's greatest obstacle to progress is ignorance. This is also true for construction, since if our workforce possessed all the technologies, skills and knowledge that it manifestly lacks, we could approach the goal of true sustainability so much faster. Training of the workforce will always remain a challenge for our industry and many efforts continue to be made to improve it.

The other major issues are improving health and safety, and last but not least improving the image of the industry in order to attract and recruit a quality workforce through providing better and more secure employment.

What can be done?

Firstly, the widespread observance of ILO core labour standards is one important aspect that calls for particular reflection especially in some countries. However, the two main items on which collaboration could most efficiently be implemented are upgrading skills and improving health and safety on construction sites.

There are three main stakeholders in the construction process; workers, employers and public administrations. The employers and workers' organisations need to work together, encompassing the involvement of sub-contractors, labour-only sub-contractors, and temporary workers. These can then lay down the norms and policies of the business, which should be conducive to all concerned and are addressed in the following paragraphs.

Upgrading of skills

Imparting skills, and upgrading them to meet the future human resource requirements of the industry, would certainly require the participation of the three main stakeholders, i.e. the government and the intergovernmental regulatory bodies, the employers' and the workers' organisations *inter-alia*, with the participation of the ILO.

The problem is in a continuous state of flux because the scope of interest of the first two is often limited to a single project, and the workers in the construction industry are often migrant and itinerant. Motivation has to flow therefore from the government or a nodal body or an association. All three stakeholders must join hands in creating training facilities and programmes. The roles of the stakeholders could be briefly outlined as follows:

the workers' organisations:

- encourage members of various social groups to undergo training, testing, and skills certification in construction trades;
- work closely with the employers' organisations to homogenise quality standards and productivity and safety norms, and monitor these constantly for upgrading them according to the newest technologies;
- come to an agreement with the employers' organisations on different wage structures for workers possessing different skills;

the employers' organisations:

- subscribe to a common cause within their association/organisation in order to facilitate training systems and sub-systems. These should include the infrastructure for imparting training, skills development, and certification of skills, based on Standard Vocational Qualification (SVQ) standards. The SVQs for different trades may be developed together with the workers organisations' based on the industry practices, and taking into account the benchmarks for productivity and safety;
- interact with government and inter-governmental regulatory organisations to ensure that commensurate tax benefits/concessions are granted to such initiatives for better corporate acceptability.

governmental and inter-governmental regulatory bodies:

- ensure that the procurement process clearly specifies that (at least a certain percentage of) workers should be trained, tested, and certified by such institutions/organisations as possess adequate capabilities for imparting skills training;
- identify and acknowledge such organisations as represent the employers and workers, and to encourage the constitution of works councils/taskforces to lay down vocational qualification standards,

and productivity norms for various construction trades;

- also required are: safety and quality standards; guidelines/benchmarks for identifying and accrediting the training systems/organisations, and also the regulatory mechanism; the nomination of regulators from among the employers and workers.

Improving health and safety

Many construction activities carry high risks of accidents and in certain cases health risks as well. Each and every accident is one too many and numerous initiatives have been taken over the years to reduce the incidence of accidents.

Occupational health and safety is invariably an area for state intervention. All countries should develop coherent national policies. These should be based on the 'Safety and Health in Construction Convention, 1988 (No. 167)'. From the standpoint of the regulators, ensuring enforcement of the regulations is invariably a challenge. Inspectors cannot be present whenever there is a potential danger, and in most circumstances site supervisors must carry the largest share of responsibility.

Never the less, knowledge about the extent and the causes of accidents and ill health remains limited in many parts of the world. Increased efforts are required to address this through the collection and dissemination of appropriate data on the causes of industrial accidents and their prevention. This should include recommendations that all workers should receive specific training in health and safety procedures as well as the increased implementation of site-specific health and safety plans overseen by site project managers. The proper coordination and implementation of health and safety measures by sub-contractors, in particular as concerns the delegation of responsibility, is equally important.

Furthermore, these training activities could also include whenever feasible, the training of trade union health and safety representatives. Joint management (employers and workers) and trade union safety committees have been established in many countries and work well. A further measure would be to disseminate information on 'best practices' through drawing on experiences with explanations from those countries that have recently succeeded in significantly reducing accidents.

One pertinent example is the inherent risk of handling (principally fibrous) asbestos that has now become widely known. Removing asbestos from existing buildings has become a highly specialised activity carried out by firms who are equipped to take all the necessary precautions. Never the less, these activities should always be backed up by coherent national policy frameworks based on the Asbestos Convention, 1986 (No. 162).

Economic aspects

Optimising the construction process and improving supply-chain management remains what it always has been; an endless debate in the industry. Regardless of how this debate continues to evolve, a key element of any construction process will remain flexibility.

In developed economies, more efforts should be made to involve contractors increasingly in optimising the design of construction projects. This can be done through simplifying bid documents without the need to develop a design fully before bids are invited. Instead tenders can be invited on the basis of performance criteria. This is likely to be known in future as 'performance-based building'. In defining performance, account can be taken of environmental performance in addition to the various other criteria required.

These kinds of developments are rarely suitable for developing countries however. If local contractors are to obtain a maximum

share of the available work, then designs should be as fully developed as possible before work commences. The emphasis should instead be put on technology transfer and training of the workforce.

Environmental aspects

Increased efforts will be needed to reduce the environmental impacts of construction materials. Strategies have already been developed, at least in outline, to:

- introduce life cycle-based environmental data schemes (LEDCM) in order to evaluate the environmental impacts of construction products and materials,
- introduce environmental product declaration schemes for construction products,
- over the longer term, consider including environmental criteria with product standards.

Reducing GHG emissions in the built environment is an issue of particular interest to contractors, especially SMEs. This has already been extensively discussed in part 1.

Importance is attached to reducing the amount of waste coming from construction and demolition sites, and increasing re-use and re-cycling of waste materials. Considerable success has already been achieved in many countries and this needs to be further developed.

Performance indicators

The construction industry needs to develop a set of indicators in order to benchmark its progress towards increasing its sustainability. This concept is still in its infancy, but increased efforts are now being made to develop and agree on a set of indicators. One such initiative is presently being financed by the European Commission and is known as CRISP: Construction and City-Related Sustainability Indicators.

Of course, indicators can be set up to measure performances at different levels. For example, they can be used to benchmark and compare the sustainability of individual buildings. Alternatively, they can be set up to benchmark a national construction industry, perhaps by region. Ideally, it would be interesting to have a set of indicators to benchmark the industry's performance across the world but this might be rather ambitious.

Even if a set of indicators could be agreed, it is questionable whether the statistics could be gathered in order to produce coherent results. It will be interesting to see whether the construction industry will succeed in agreeing on a set of sustainability indicators over the next decade, but any such initiative will at least constitute a step in the right direction.

An international platform for achieving sustainable built environments, and a worldwide programme for the introduction of sustainable construction in developing countries, are needed.

An international platform should be established for all the main stakeholders to address the question of how to achieve sustainable built environments. Its objectives are expected to include achieving consensus-based definitions of priorities for international research and development in general and, in particular, the development and introduction of sustainability performance indicators, benchmarking systems, labelling systems, procurement issues, etc.

A worldwide programme aiming at the introduction of Sustainable Construction in Developing Countries (SCDC) should also be undertaken.

These initiatives are expected to be initiated and led by the CIB, and indeed discussions are already underway between CIB and UNEP's

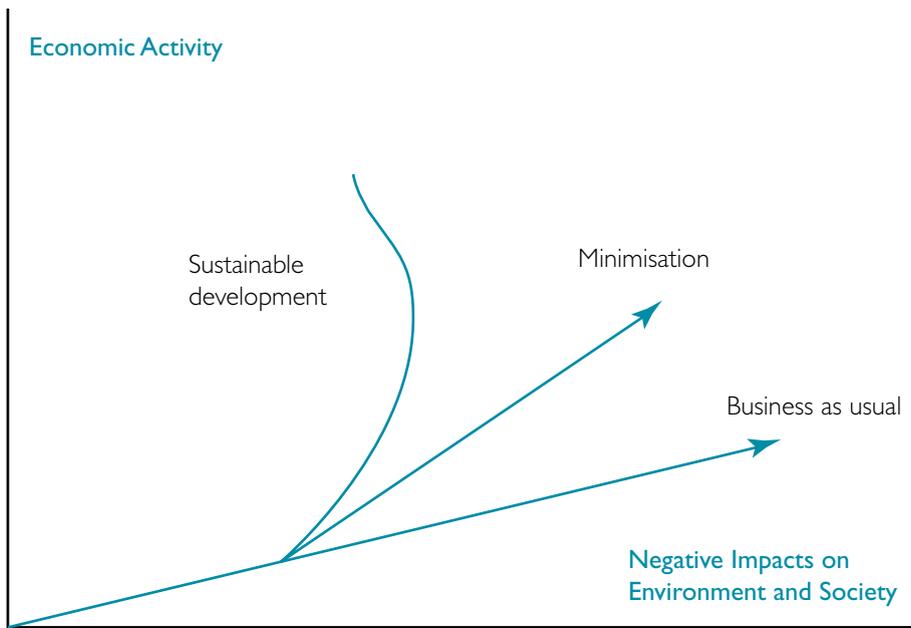
International Environmental Technology Centre (IETC) as concerns the proposal for the SCDC programme.

Research and development

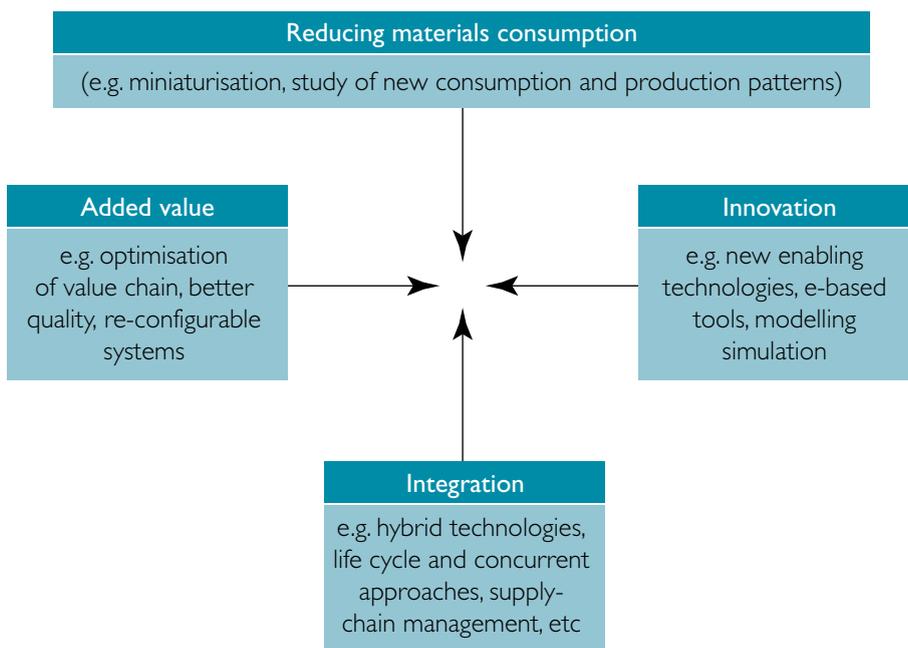
Over the last five years the emphasis in terms of R&D initiatives has been re-directed to focus on the sustainability aspects of construction. This positive approach needs to be given increased emphasis in the medium-to-long-term perspective.

An area of particular importance expected to have far-reaching effects on sustainability in the urban environment, will be the development of renewable technologies, and the consequent reduction in the consumption of fossil fuels. Enormous efforts are underway to develop these technologies and make them competitive with oil and gas.

Existing paths should be shifted towards sustainable development:



In this context, research priorities for future production systems could be:



Annexe I: UNEP International Declaration on Cleaner Production

The CICA/UNEP Declaration of Christchurch

On 19 February 2001, in Christchurch, New Zealand, Prof.-Dr Rogge, President of CICA, signed the International Declaration on Cleaner Production of the United Nations Environment Programme, so joining the current 223 other signatories representing all fields of private and public sector activities worldwide. This signing ceremony took place at the IFAWPCA (Federation of Asia and Western Pacific Associations) Convention, itself dedicated to 'Construction in Partnership with the Environment'.

By virtue of this text, contractors all over the world confirm their commitment to strive for the goals of sustainable development, through promoting eco-efficiency, pollution prevention and green productivity methods as preferred options. This signature marks the logical follow-up to already well-established and widespread practices in the construction sector:

CICA is the representative body of the construction and infrastructure sector, bringing together contractors from 78 countries in the world, accounting for \$3.5 trillion in revenues and employing more than 50 million people.



INTERNATIONAL DECLARATION ON CLEANER PRODUCTION

We recognize that achieving sustainable development is a collective responsibility. Action to protect the global environment must include the adoption of improved sustainable production and consumption practices.

We believe that Cleaner Production and other preventive strategies such as Eco-efficiency, Green Productivity and Pollution Prevention **are preferred options**. They require the development, support and implementation of appropriate measures.

We understand Cleaner Production to be the continuous application of an integrated, preventive strategy applied to processes, products and services in pursuit of economic, social, health, safety and environmental benefits.

To this end we are committed to:

LEADERSHIP	<p><i>using our influence</i></p> <ul style="list-style-type: none"> • to encourage the adoption of sustainable production and consumption practices through our relationships with stakeholders.
AWARENESS, EDUCATION AND TRAINING	<p><i>building capacity</i></p> <ul style="list-style-type: none"> • by developing and conducting awareness, education and training programmes within our organization; • by encouraging the inclusion of the concepts and principles into educational curricula at all levels.
INTEGRATION	<p><i>encouraging the integration of preventive strategies</i></p> <ul style="list-style-type: none"> • into all levels of our organization; • within environmental management systems; • by using tools such as environmental performance evaluation, environmental accounting, and environmental impact, life cycle, and cleaner production assessments.
RESEARCH AND DEVELOPMENT	<p><i>creating innovative solutions</i></p> <ul style="list-style-type: none"> • by promoting a shift of priority from end-of-pipe to preventive strategies in our research and development policies and activities; • by supporting the development of products and services which are environmentally efficient and meet consumer needs.
COMMUNICATION	<p><i>sharing our experience</i></p> <ul style="list-style-type: none"> • by fostering dialogue on the implementation of preventive strategies and informing external stakeholders about their benefits.
IMPLEMENTATION	<p><i>taking action to adopt Cleaner Production</i></p> <ul style="list-style-type: none"> • by setting challenging goals and regularly reporting progress through established management systems; • by encouraging new and additional finance and investment in preventive technology options, and promoting environmentally-sound technology cooperation and transfer between countries; • through cooperation with UNEP and other partners and stakeholders in supporting this declaration and reviewing the success of its implementation.

Dr Thomas Rogge
CICA President

Ing. Miguel Angiel Salinas
CICA Vice President

Garrard Tait
IFAWPCA President

Wilhelm Küchler
CICA Vice President

Dr Ing. T. N. Subbarao
CICA Senior Vice President

Peter K. Wert
CICA Vice President

Annexe 2: IFBWW and CICA message of common understanding on global social dialogue in the construction industry

Press Release

Geneva-ILO, 16 March 2001 - The representatives of World Bank (WB), International Labour Organisation (ILO), the Confederation of International Contractors' Associations (CICA) and International Federation of Building and Wood Workers (IFBWW) met at the ILO headquarters in Geneva in order to discuss developments at the WB, World Trade Organisation (WTO) and ILO. The purpose of the meeting was to find a common understanding and a platform for future cooperation. CICA and IFBWW issued the following statement;

It is the mission of CICA to serve, promote and enhance the construction industry on behalf of its member federations in matters of international concern. CICA gathers six regional federations in the world, representing 78 countries.

The IFBWW is a global union secretariat organising workers in the construction, building, wood, forestry and allied trades and industries. The IFBWW represents over 11 million workers, organised in 285 unions in 124 countries throughout the world. Representatives of both organisations met on 16 March 2001 in Geneva and expressed their common understanding.

The construction industry in the world represents a \$3,5 trillion market volume and a 50-million people working force. Construction creates employment, protects the environment, facilitates modern means of transport and also improves the living conditions of mankind. Moreover, the link between infrastructure and development has been established in various analyses and is widely recognised. If the link

between infrastructure and development has been clearly defined for many years, connection with the reduction of poverty is now being more and more underlined. As a matter of fact, infrastructure and building give people the ways to improve health, education, employment and at the end, economy as a whole.

A significant proportion of infrastructure funding is provided by international institutions including development banks such as the World Bank, Inter-American Development Bank, Asian Development Bank and the African Development Bank. These funds create employment for thousands of workers, many of whom are engaged in construction. The size and scope of these activities place the World Bank and other international financial institutions in a strategic position to promote socially and environmentally responsible business practices. The IFBWW and CICA ask the WB and regional development banks to reflect the ILO Declaration of Fundamental Principles and Rights at Work in the policy of the Bank, and to enforce anti-corruption mechanisms.

CICA and the IFBWW:

- Note that construction is an important factor in economic growth and that economic growth is a prerequisite for social progress, but that economic growth in itself does not guarantee social progress;
- Further note that economic growth must be derived from sustainable industrial development and;
- Commit themselves to work in this direction to achieve social and sustainable development in construction activities;
- Acknowledge the need to observe the eight core Conventions of the ILO in order to create a minimum level of international social standards.

In this spirit CICA and IFBWW shall work together to achieve the objectives and undertakings given in this document. CICA and IFBWW will engage in an ongoing dialogue and will meet regularly.

Annexe 3: FIEC's European Charter for the Environment

European Construction Industry Federation

26 May 2000 - Luxembourg

"A Europe building efficiently for the environment and jobs"

FIEC, the European Construction Industry Federation, represents via its 29 national member federations in 22 countries (16 EU & EFTA, the Czech, Slovak, Hungarian, Polish and Romanian Republics and Cyprus) construction firms of all sizes, carrying out all sorts of building and civil engineering activities.

Introduction

- a) The 1,916,000 European firms in the construction industry together with their 11 million workforce build houses, construct community facilities and develop the built environment which is desired by 375 million Europeans.
 - b) The construction industry is Europe's largest industrial employer and one of its particular characteristics is its function as a generator of employment. The so-called "multiplier effect" is such that one person working in the construction industry gives rise to two further jobs in other sectors⁽¹⁾.
 - c) Furthermore, construction is essentially a local activity capable of creating new job opportunities in Europe.
 - d) Europe is gradually being transformed into a post-industrial society in which major infrastructure investments and cities play a key role. For Europe to maintain a leading position in terms of world competitiveness, it is crucial that Europe's cities be provided with better infrastructure in order to strengthen their position as centres of technological, social and cultural innovation.
- Cities should pay particular attention to infrastructure in order to ensure that it is developed in an environmentally friendly manner:
- e) The quality of the built environment affects not only the role of individual cities and the advantages which each of them offers but also the quality of life and the well-being of European society as well.
 - f) The construction firms note with satisfaction that the priority given to the environment is linked to maintaining a proper level of economic development that in turn will lead to greater prosperity and improve the quality of life. In this respect, the provisions concerning the integration of the environment into a broad range of EU policies included in the Treaty of Amsterdam, will play a strategic role in achieving these objectives.
 - g) City administrations in particular are grappling with new pressures resulting from growth, and with the legacies of the recent past: traffic congestion, social exclusion and pollution, etc. In other words, the urban environment needs to be improved and to this effect new investments are needed. In transforming these investments into concrete form, the construction industry plays a strategic role.
 - h) Construction projects that are carried out for the specific purpose of improving the environment, or in such manner as to reduce their environmental impact, involve additional costs, that in most cases can only be met by an enhanced level of public funding.
 - i) FIEC calls upon national governments and public authorities in Europe to give strategic priority to environmental programmes within their economic and financial policies and to make provision for the necessary level of investments.

⁽¹⁾ Communication from the Commission "The Competitiveness of the Construction Industry" COM (97) 539 of 4/11/1997, chapter 2.

- j) The European construction industry wishes to make an active contribution to the success of this huge construction effort for the benefit of present and future generations.

This charter constitutes a declaration of principles by convinced European professional associations in this regard.

Article 1 - Improving environmental performance

In the context of current perspectives, there is a need to improve environmental performance across all sectors of activity. This has been stressed in numerous initiatives² by the European Council through integrating environment and sustainable development, such that environmental considerations become part of any new initiative in all policy sectors.

FIEC intends to play a role in lending its support to the initiatives and policies laid down in the Treaty and contained in the *acquis communautaire* and put into effect by the member states.

To this end, FIEC believes that the environment should be given priority and will do its part, working within the framework of European legislation and policies, in contributing towards the concept of sustainable development, and commonly understood as meaning 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs'⁽³⁾.

Article 2 - Sustainable construction

The term 'sustainable construction' has different approaches and priorities in various countries. Kibert⁽⁴⁾ defines it as 'the creation and responsible management of a healthy built environment based on resource-efficient and ecological principles'.

FIEC intends to lay increased emphasis on the development of the concept of 'sustainable construction'.

To this end, FIEC will promote actions in order to encourage public and private clients in such manner that construction projects take account of the concept of 'sustainable construction' including enhancing the environmental quality of construction.

Article 3 - Alternative proposals

Construction firms possess know-how, technical skills and innovative abilities which, if developed and applied, can add value and raise the quality of their projects.

FIEC intends to promote actions in order to ensure that this potential is used more effectively in the field of the environment.

To this end, FIEC will encourage clients to invite construction firms to propose alternative solutions which, with due regard for the environmental legislation involved, support European policies for the protection of the environment.

Article 4 - Environmentally-friendly site installations

Persons living in the vicinity of construction sites, that may be affected by contractors' temporary site installations necessary for the execution of the works, often express the wish to be informed about them prior to the commencement of construction activities.

FIEC intends to promote initiatives in order to facilitate greater acceptance by residents living and working in the vicinity of construction sites.

To this end, FIEC will encourage – in cooperation with their clients – construction firms to organise and manage construction sites in such a way that they will not cause a major nuisance in their immediate environment.

(2) European Councils of Cardiff (1998), Cologne and Helsinki (1999) and the Treaty of Amsterdam, (1997).

(3) Brundtland Report 1987 (The First International Conference on Sustainable Construction, Tampa).

(4) The First International Conference on Sustainable Construction, Tampa

Article 5 - Educational training programmes

Respect for the environment is a major factor in promoting social cohesion.

FIEC intends to strengthen, among all persons working in construction firms, both individually and collectively, initiatives aimed at stressing the importance of the environment.

To this end, FIEC will support educational training programmes in the field of the environment and will favour educational methods designed to give an 'environmental civic education' to young people who are receiving training in the building trades.

Article 6 - Energy efficiency in the built environment

Built facilities currently account for more than 40% of total final energy consumption, and in terms of energy demand are the largest single source of greenhouse gas emissions in Europe.

FIEC intends to work together with the European Institutions and the member states in such manner as to ensure that the European Union meets its commitments under the provisions of the Kyoto Protocol.

To this end, FIEC will encourage policies aimed at up-grading, retro-fitting and where necessary, rebuilding facilities in order to reach higher environmental standards in urban development processes and in such manner that the construction industry makes a maximum possible contribution to the abatement of greenhouse gas emissions.

Article 7 - Environmental management systems

Many firms increasingly make use of environmental management systems to promote enhanced environmental performance.

FIEC intends to promote and encourage the use of environmental management systems in the construction industry.

To this end, FIEC will encourage construction firms to increasingly make use of such systems, suitably adapted to the requirements of the construction of built facilities.

Article 8 - Expansion of the EU

FIEC takes note of the emerging construction markets of in the countries of central and eastern Europe. In these countries insufficient facilities often come on top of serious deficiencies relating to the environment.

FIEC intends to see the environmental gap between eastern and western Europe reduced as quickly as possible.

To this end, FIEC will contribute to the progressive dissemination of construction firms' know-how, so that all countries of the enlarged EU will soon be at the same level in the field of the environment as regards quality, regulations and standards.

Article 9 - Waste management

Throughout Europe, the management and disposal of waste is a priority by virtue of an increasingly complex framework of national and European legislations. In view of the ever-increasing quantities, the European Commission has recognised construction waste as being a priority waste stream.

FIEC recalls that construction firms produce relatively little polluting waste and clients should be encouraged to co-operate in the management of the large quantities of excess inert materials involved. They also have the technical capacity to use, either through reuse or in the form of recycled materials, both their own secondary materials originating from construction and demolition activities as well as those coming from other industries. However, this potential needs to be further developed.

To this end, FIEC, through the identification and adoption of European best practice, will encourage construction firms and their clients to endeavour to bring about conditions which will make it possible to remove the economic, regulatory and cultural obstacles which hinder recycling of previously used materials.

Article 10 - Preserving Europe's cultural heritage

Europe has acquired over centuries a rich cultural heritage, much of which is to be found in the built environment. The maintenance and rehabilitation of this heritage is an ongoing process.

FIEC intends to encourage the maintenance and renovation of Europe's cultural heritage.

To this end, FIEC will support European and national programmes, underpinned by research and development, aimed at upgrading the urban cultural heritage and raising environmental standards necessary to improve the quality of life and economic efficiency, while reducing social tensions.

Article 11 - 'International Declaration on Cleaner Production'

FIEC takes note of the 'International Declaration on Cleaner Production' issued by the United Nations Environment Programme.

FIEC intends, either directly at the European level, or alternatively at the world level through the Confederations of International Contractors' Associations (CICA), to become a signatory to the 'International Declaration on Cleaner Production'.

To this end, FIEC will take initiatives to promote this International Declaration and ensure that the European construction industry, in collaboration with the European Institutions and member states' governments, takes appropriate measures in pursuing its objectives.

Article 12 - United Nations 'Global Compact'

FIEC takes note of the United Nations 'Global Compact' launched by the United Nations Secretary-General at the World Economic Forum in Davos in 1999.

FIEC intends to support the Secretary-General's request addressed to corporate leaders to participate in the 'Global Compact' and to uphold the three areas of shared international agreement namely: human rights, labour standards and environmental protection.

To this end FIEC, as a major stakeholder and in its role representing Europe's largest industrial employer, will set up links between the pertinent pages of the FIEC and the Global Compact Web sites.

Annexe 4: Case studies

Case study I

Environmental concerns guide ACM

Maine contractors work to protect state's waterways

Renowned for its 3,500 miles of picturesque coastline, 6,000 pristine lakes and ponds, and 32,000 miles of rivers and streams, Maine places a high premium on its water resources. And for good reason: as ice age glaciers made their slow retreat, it took millions of years to form the craggy, rockbound coast and inland waterways which today characterise Maine as a vacation paradise. What took an epoch to create could be damaged or destroyed in the blink of an eye.

Associated Constructors of Maine (ACM) and its members have proven instrumental in protecting the state's valued water resources, ensuring they remain healthy to support not only wildlife and drinking water, but recreation and industry as well.

Industry and state partnership

For the past three years, the chapter has partnered with the Maine Department of Environmental Protection (DEP) to conduct erosion control and non-point source contamination courses. These efforts have made a significant difference by educating 373 individuals from ACM member firms on best practices regarding construction near inland waterways and wetlands.

"We could never have done this without the assistance of ACM," noted Bill Laflamme of DEP's Watershed Management Division. "The advertising, registration, and co-ordination by ACM members and staff all contributed greatly to make this a successful venture that we would certainly like to continue in the future."

Additionally, those who successfully complete the training are certified by DEP, making them

eligible for accelerated permitting and discounts on materials from participating suppliers, including ACM members AH Harris & Sons of Portsmouth and EJ Prescott. Thus, certified contractors maintain a distinct advantage in the state's increasingly environmentally-conscious construction marketplace.

ACM and DEP have also teamed up several times to promote bond issues which enhance water quality through sewerage facility construction, landfill capping, and tyre dump remediation, among other means. In fact, ACM was instrumental in ensuring that the Pine State Recycling tyre dump in Nobleboro was remediated and graded to protect the valuable environmental resources surrounding the site, including the abutting wetlands and Damariscotta Lake.

The project began with a DEP bond issue championed by ACM which funded the removal of roughly 1.5 million scrap tyres from the Nobleboro site. The tyres were chopped up and then used as paper mill boiler fuel and fill for a highway bypass in Maine's midcoast area.

Unfortunately, the bond did not fund work other than the tyre removal, prompting ACM and its members to offer services free of charge to the state. Specifically, the two-plus acre site needed significant grading, including knocking down a 12-ft-high, 250-ft-long dirt berm and using the fill from the berm as grading material along the western slope.

Southworth-Milton of Scarborough donated the use of a bulldozer; the chapter purchased the fuel; and Bridgecorp of Augusta, George C Hall & Sons of Rockland, and HE Sargent of Stillwater donated the services of an equipment operator for one day each to get the job done. Today, the hillside is green again and the threat of environmentally hazardous runoff has been mitigated.

“We’re very happy with the work the ACM crews did for us,” said DEP’s Linda Butler who oversaw the project. “These folks really pushed hard to get the job done on time; we’re extremely grateful for their effort.”

Environment-friendly solutions

HE Sargent – along with E/Pro Engineering of Augusta and several other ACM members – undertook another prominent project involving significant water issues when they devised a plan to remove the Edwards Dam on the Kennebec River.

At the urging of several environmental groups, the state and the Federal Energy Regulatory Commission agreed that, after 162 years the Edwards Dam had outlived its usefulness and should be removed. It was to be the first such dam removal in the country, drawing the attention of media outlets nationwide and demanding the utmost care.

Initial plans called for dynamiting the concrete, steel, and timber structure. However, by constructing a series of cofferdams, the HE Sargent crew was able to use a hoe ram to dismantle the dam in sections. This approach not only avoided the fish kill and major turbidity that likely would have accompanied blasting, it also resulted in a significant cost savings.

Following removal of the 25-ft-high, 917-ft-wide dam, 17 additional miles of the Kennebec River flowed freely for the first time since 1837. Biologists now expect a dramatic increase in populations of migratory fish, including striped bass, salmon, shad, herring, and alewives.

“H.E. Sargent is a highly respected Maine-based company which added real value to the dam removal team,” said Evan Richert, director of the Maine State Planning Office. “The importance of the success of this team cannot be overestimated.”

Not all environmentally-sensitive projects are quite so high-profile, though. For example, Shaw Brothers Construction of Gorham, Maine, was charged with stabilising 1,200ft of a deteriorating 30-ft-high eroding slope overlooking Sebago Lake.

Bracing the heavily eroded slope was doubly important since the lake is not only used for recreational purposes, but also serves as the drinking water source for 170,000 residents throughout greater Portland.

To accomplish the job, the Shaw Brothers crew installed a cellular confinement system on the upper portion of the slope and placed rip rap below. Since the job site was directly adjacent to the Portland Water District’s intake area, turbidity curtains were installed, safety checks were conducted on all equipment and fuel lines, and site-specific spill-prevention controls were developed.

Rather than use cranes to distribute materials and equipment to the shoreline, Shaw Brothers received regulatory approval to construct a swale ‘road’ to access the shore. This and other innovations enabled the crew to perform the work without impacting the environment and complete the job in 60 days instead of the 240 days allowed in the contract. For this effort, the firm was awarded a Build Maine Award from ACM.

Another project which caught the attention of Build Maine Award judges involved renovation of a landmark building. Following years of neglect by the property owners, the brick façade of the historic Lafayette Building in Portland was in dire need of refurbishment. The dilemma was deciding how best to strip off and dispose of the drab exterior paint without fouling nearby Casco Bay.

Following much research, Standard Waterproofing of China, Maine, determined that heavy-duty paint remover coupled with a

limestone afterwash would provide the most cost-effective and environmentally-sound removal and disposal method.

The ACM firm contacted the Environmental Protection Agency and the City of Portland to ensure code compliance. The EPA reviewed and approved the contractor's innovative proposal for capturing the waste material in tanks where it would be treated with a limestone afterwash to bring its pH to a neutral level. Following this treatment, the neutralised solution could then be safely disposed of in Portland's storm drains. Thanks to Standard Waterproofing's careful analysis, the firm was able to restore the landmark building to its original glory without any negative environmental impact.

These are just a few examples of the environmentally-conscious practices employed by ACM members as they help protect our valuable water resources while 'Building A Better Maine'.

Case study 2

West Virginia contractor eliminates acid mine drainage at abandoned coal preparation facility Alwood Co preserves wetlands to filter toxic coal refuse from surface water

An abandoned coal preparation facility in north-central West Virginia's Lewis County used to cause residents nearby to worry about flooding dangers and environmental, health, and safety issues. But they don't have to worry any more.

The effects of the abandoned coal preparation facility caused serious flooding along the receiving stream – Grass Run – and was posing a risk to the health and safety of the landowners living downstream along Grass Run Road. To help combat this area's problems, the Office of Abandoned Mine Lands and Reclamation contracted with Alwood of Clarksburg, West Virginia, to provide site restoration.

On-site were nine water-treatment ponds; 30 acres of unvegetated, toxic coal refuse, and more than half a mile of dangerous highwall. Several of these ponds were nearly full of slurry from eroded coal mines and sediment. A few of the ponds had breached, allowing most of the contents to wash downstream. Pond risers and pipes had either been completely destroyed or even washed out, and none of the emergency spillways functioned properly. Uncontrolled run-off also severely damaged most of the drainage channels extending between each impoundment.

The overall plan involved enhancing one freshwater pond located at the head of the hollow, eliminating five of the old water-treatment ponds filled with metal precipitate and slurry, converting the two largest treatment-ponds into aerobic wetlands, and enhancing the two lower ponds for use as storm water detention basins.

Alwood's contract consisted of eliminating over a half mile of highwall, excavating 400,000 cubic yards, and installing over 8,000 linear feet of grouted fabricform ditches to help convey the water to two newly-constructed wetlands. In addition, five slurry ponds were eliminated, along with the reconstruction of two detention ponds and the reclamation of a 30-acre acidic coal refuse pile.

Improving water quality

One of the major concerns of the project was its existing water quality, a pH level of 2.0. The production of acid mine drainage (AMD) was a result of surface water migrating through the unvegetated coal refuse and spoil material, causing toxic levels of acid and metals such as iron, manganese, and aluminium to be leached into the ponds, ditches, and waterways. Gradually, this drainage flowed into Grass Run and caused severe reduction in downstream water quality.

Constructed at the toe of the large coal refuse pile, the first smaller wetland area, provides long detention times, thus promoting good precipitation of any leached-out metals. The second larger wetland area uses plants such as cattails and rushes to further reduce flow velocity, allowing even more metal extraction. Working together, these passive treatment systems result in a greater water quality improvement.

The two detention ponds located downstream of the large wetlands were reconstructed with new principal spillway pipes. These detention ponds collect sediment and regulate the outflow of water, which eliminate flooding.

Another unique project feature was the strong reliance on a special type of drainage-proof device built to minimise surface water infiltration into the newly soil-covered coal refuse and slurry. Project engineers realised early on, that this element was critical if AMD was to be eliminated at the site.

After the project was completed, the water quality pH level was improved to 6.0. The design of the grouted conveyance ditches carried the acidic water to the constructed wetlands, planted with aquatic vegetation that naturally treats the water:

“With these items addressed, the poor water quality, erosion, and flooding were eliminated, making the watershed no longer an environmental issue or threat to the residents living downstream,” said Charles Stover, acting chief for the Office of Abandoned Mines Land and Reclamation. *“The Grass Run Refuse project resulted in one of West Virginia’s best reclamation success stories from the standpoint of overall effectiveness. It not only eliminated the threat of flooding for residents along Grass Run, but turned damaged water treatment ponds into valuable wetland habitat,”* he said. *“On most days, visitors observe beaver and muskrat activity throughout the site, along with a variety of ducks, Canada geese, and herons. Migrating birds nest and raise*

their young on both of the site’s two larger detention ponds, and whitetail deer and coyote also inhabit this once barren and environmentally degraded abandoned mine site.”

The Department of Environmental Protection Abandoned Mine Lands and Reclamation office submitted the project for the DEP AML&R and West Virginia Coal Association State Award. Alwood Company received the prestigious Ducks Unlimited Award at the 28th annual Mining Symposium in Charleston, West Virginia, in February 2001. Alwood was judged as best in the state from over two dozen major reclamation projects. Its work in reclaiming the Grass Run Refuse site was praised for quality workmanship.

Alwood is only the second general contractor in West Virginia to receive this prestigious Ducks Unlimited Award. Alwood General Manager Spencer Wooddell said the company stands by its 3Ps policy: ‘Professionalism, Production, and Pride.’

“This is something we try to achieve on all of our projects, and this award complements our goal,” Wooddell noted. *“Hats off to all of our employees and suppliers involved in this project.”*

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Annexe 5: The environmental impact of construction activities in Mexico

The Mexican official norms concerning environmental matters – apart from allowing the authorities to establish the permissible maximum limits of emissions of toxic pollutants at various levels and the criteria for their verification – play a fundamental role in determining legal certainty as well as fulfilling an equally important role in promoting technological change.

On the other hand, the increasing tendency of industry to move towards self-regulation through the application of voluntary standards, and to seek out in its own interest, levels of performance that go beyond those established by the official standards, effectively enhance these instruments in such a way as to complement the official regulations.

In the specific case of the construction sector, the General Law of Ecological Balance and Environmental Protection (LGEEPA) drawn up by the National Institute of Ecology (INE) and adopted in July 1998, establishes among other things, the following requirements. They apply to the design, construction and operation of real estate and infrastructure developments, both in rural as well as in urban areas, and which emphasise the evaluation of environmental impacts, classified as follows:

- preventive report, when it is anticipated that the construction project or activity will not lead to significant environmental impacts or when it is carried out in accordance with article 31 of the LGEEPA,
- demonstration of environmental impacts in their general, intermediate and specific forms, when the potential exists for the construction project to have a significant environmental impact.

This demonstration consists of a study of the present state of the natural environment, the modifications that this will undergo as a consequence of the construction and operation of the project, and the contingency measures that the applicant proposes taking in order to avoid or mitigate such impacts should they be negative.

More particularly, if the construction of real estate developments includes the control and treatment of waste water, then details of the measures foreseen in order to guarantee the quality of the water that is returned to water courses aquifers, shall be provided.

In this respect, Mexico has made significant progress in the field of the relevant standards and regulations, some of which are presented below:

New Standard for waste water

The third line of action concerns urban development, which is an unbalanced and irreversible process that consists of multiple sectoral and territorial expressions of interest linked to decisions affecting consumption and productive investment. The evolution of the structural and sectoral integration of the economy forms the basis of the urbanisation process. We can predict with certainty that urbanisation will continue in the future until there is a concentration of a sufficiently high proportion of wealth, income and productivity of the country's population in cities, to the point that social interaction and environmental objectives are reached.

Since most of the population will eventually live in cities, urban development, on a substantial basis will need to be sustainable.

The new regulatory trends are implicit in the recently issued rules on waste water, particularly the already-published NOM-001 and the draft NOM-002, which mark a substantial turn toward the correction of the

deficiencies indicated above, and whose most important characteristics are the following:

- they control the totality of the productive agents that are discharged into a specific body, under the same parameters;
- they obligate us to comply with the same parameters, regardless of the conditions of their crude discharge;
- they internalise the associated environmental costs in a differentiated manner; demanding less effort from relatively clean processes and more effort from relatively dirty ones; thus, they more equitably distribute the cost of avoiding pollution;
- they stimulate a localisation of new companies in accordance with the capacity of the receptor bodies to receive the discharge;
- they provide gradual periods of compliance, which allow for a process of adoption of changes instead of remedial solutions to comply with limits,
- the deadlines are different for agents of different sizes, depending on their economic capacity;
- they limit the discharge according to the characteristics, use and general load capacity of the receptor body;
- they include the possibility of becoming stricter if required, as they establish a change in the use of the receptor body;
- they are immersed in a wider regulatory scheme, which includes the use of economic instruments (particularly incentives and punishments in the Federal Law on Rights, and the foundation for regional treatment markets), specific direct regulatory instruments (Particular Discharge Conditions), and social participation entities (Cuenca Councils).

All of the above means that, without becoming environmental quality regulations in the strictest sense, they are a bridge between the social goals for water quality and the specific discharge limits.

What is lacking in this scheme is the regulation of the conditions of discharge through injection and infiltration into underground aquifers, as well as the handling of sludge from treatment plants, which affect the operation of the plants and constitute a potential source of opportunities for environmental improvement if they are able to be developed appropriately, since sludge is often a significant choice for making improvements in the agricultural sector.

Annexe 6: International Federation of Asian & Western Pacific Contractors' Associations (IFAWPCA) - industry sector report

Introduction

The concept of sustainable development was introduced in a 1987 report entitled 'Our Common Future' by the World Commission on Environment and Development of the United Nations. This report has been referred to as 'the Brundtland Report' in honour of the Chairperson, Dr. Gro Harlem Brundtland, Prime Minister of Norway. The Commission defined sustainable development as: "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

For most of us, development means progress or change for the better. Development involves maximising the efficiency of resource allocation to meet needs - which is the dominant paradigm in economics at the present time. Thus, for most of us, sustainable development is, and should be, an economic concept.

The Commission integrated sustainable development into the world's economy as follows: Sustainable development is "... a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development ... institutional change and the ability of the biosphere to absorb the effects of human activities are consistent with future as well as present needs."

The Commission cautioned, however, that "sustainable development can be pursued

more easily when population size is stabilised at a level consistent with the productive capacity of the ecosystem." This statement expanded the role of economics in meeting the needs of the current 'reality.' Sustainable development holds humankind responsible for existing circumstances and challenges humankind to accept responsibility for instituting the changes necessary to attain sustainability. This challenge was reinforced at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992.

The conference's principal product (endorsed by the more than 100 heads of state and close to 10,000 delegates) was an agenda for change, called Agenda 21, a description of perceived needs and proposed actions to bring humankind into harmony with the finite resources of the earth by the middle of the 21st century. This concept of sustainable development consists of the following four interrelated but separate ideas:

- meeting both present and future needs – which establishes the goal for sustainability,
- meeting needs – which defines the goal for development,
- maintaining consistency between population size and ecosystem productive capacity – which recognises that there are limits and requirements for balance,
- implementing a process of change – which acknowledges that the definition of needs and the requirements for attaining a sustainable balance will change with situations, conditions and time.

MALAYSIA

Malaysia is probably one of the few countries in the world that has actively tried to balance environmental conservation with economic development. This has not been easy given the fact that Malaysia is a nation struggling with issues of managing change, while ensuring a fair and equitable distribution of the nation's wealth.

Effective implementation of development plan policies and development control systems is closely supported by planning guidelines. Planning guidelines specify what development policies mean in practical terms. As such, they are an important aid to planners and decision-makers in guiding towards a built environment which is orderly while, at the same time, safeguarding the natural environment.

Act 172 created the State Planning Committee (SPC) which is chaired by the Menteri Besar or Chief Minister of a given state. It is the highest land use planning decision-making body of a State. Act 172 also stipulates that every local authority is to be the 'local planning authority' for an area.

HONG KONG

In recent years, the Hong Kong Special Administrative Region (HKSAR) Government has brought much pressure on construction contractors by imposing a wide range of environmental protection legislation. Enforcement of the legislation leads to many prosecutions and eventually convictions.

Actually, most contractors are not performing any worse than other business operators. It is due to the fact that too much environmental legislation was promulgated by the HKSAR Government in a short span of time and a lack of technologies providing solutions for the construction industry that has led to frequent violations of the legislation by Hong Kong's construction contractors.

The environmental protection awareness of Hong Kong's contractors is improving, although the number of environmental convictions remains high. The construction industry is trying hard to adjust its operations to meet the expectations of society and the challenge is formidable.

Meeting society's demand

Admittedly, the operating environment of the construction industry in Hong Kong is

changing at an unprecedented rapid rate over the last 20 years. The change is driven internally by the increasingly sophisticated need of Hong Kong people for better living standards and a healthy environment. Construction contractors are trying to satisfy their needs by improving management and technologies.

Several years ago, illegal dumping at sea was a very common practice in Hong Kong, causing serious pollution to the harbour. In order to stop the malpractice, the Environmental Protection Department (EPD) wanted marine contractors to install an Automatic Self Monitoring System (ASMS) on all dumping barges to monitor their dumping activities. The construction industry helped EPD to arrange trial tests of the system on the dumping barges.

The trial testing was very successful. It demonstrated that the system is effective in controlling dumping activities and does not affect operational efficiency. The price of the system was also greatly reduced when the suppliers, which took part in the trial, found that they are in competition with each other. In the end, contractors were willing to install the system on their barges and the plan of the EPD was implemented smoothly.

Construction contractors have also contributed to the reduction of construction noise in recent years. Responding to a plan of the EPD to reduce piling noise, piling contractors rescheduled their operational sequence so that they are able to reduce the percussive piling operations to three hours daily, while still maintaining the productivity level. They also plan to phase out the noisy diesel hammers by using hydraulic hammers, which generate lower noise levels.

However, construction contractors alone are not capable of revolutionising the construction industry so that it will satisfy the demand of society completely. Project promoters have to attach a value to the environmental

performance of their projects. The Authority also has to support the construction industry proactively so that it can fulfil this task.

The concern of construction contractors is that both project promoters and the Authority have left the duty and responsibility totally to them. Their challenge is to meet all the environmental legislation when the project promoters do not attach any value to their environmental performance and the Authority is taking a high-handed prosecution approach, without lending much assistance to them.

Pro-active actions

Through supporting pro-active actions of the Authority, project promoters and the contractors produce better results in improving the environmental performance of the industry. The normal construction contractors want to do things better, and they do not like to be prosecuted by the Authority for violating the environmental regulations. However, if the contract requirements are unreasonable and onerous, and the required technical or financial resources are too much for them to bear, they will not be able to meet all the legislative requirements and are forced to face prosecution and conviction.

This scenario is not helping to improve the environment at all. The Authority can promote better results by spending its efforts to solicit the co-operation of industry in the development of reasonable and practical environmental protection policies and initiatives. This approach has proven to be very effective and led to good results as shown in the two examples cited above.

SINGAPORE

Many construction companies in Singapore have obtained the ISO 9000 certification and some of them recently went on to obtain their ISO 14000 certification. Singapore construction companies are very proactive on environmental issues in the course of the construction process, for example, in the area

of construction waste by looking for ways to minimise wastage, implement proper waste disposal systems and recycle waste. In the area of environmental health control, SCAL Members are actively involved in the prevention of mosquito breeding, emission control and noise control.

SCAL works closely with the Ministry of the Environment on policies and related administration issues to ensure a close partnership in achieving common environmental goals in the construction industry.

INDONESIA

Sustainable construction

The Law No. 18 on Construction Services in 1999 which is effectively in force as of 07 May 2000 regulates the activities of parties either as a contractor or client, as well covering the environmental protection programmes.

Law No. 4 dated 1982 concerning the 'Basic Regulation on Environment' contains regulations and conditions prior to carrying out construction or development activities. In addition to ISO certificates acquired by contractors, measures to protect the environment are strictly exercised, and this obviously leads to cleaner production. Thus contractors are not merely acting as the agent for carrying out instructions by their clients. Clients should strictly obey the environmental law and perhaps be the one responsible for damage to the environment.

Furthermore, in Chapter II: Principles and Objectives, Article 2 states "Regulation of a construction service shall be based on the principles of honesty and fairness, beneficial, harmony, balance, autonomy, transparency, partnership, security and safety in the interests of society, nation and state."

This article contains the philosophy of sustained national development. Whereas, the legislator, together with parties providing

construction services appreciate the need for sustained development for the benefit of the society.

Hence, it is not simply a matter of fulfilling immediate needs only.

Universally true is a common phrase stating that 'construction is the road to recovery.' It is exercised in many countries whenever there is an economic down turn. Governments' develop strategies to promote construction activities in order to enable the economy to return to normal.

Further, the Law states:

- both contractor and client should be professional,
- construction workers should have certificates,
- the content of contracts should be fair and equal.

Should parties follow and strictly obey the Law, obviously sustainable construction could be achieved.

On the other hand, the pressures of urbanisation driven by the migration of populations from rural areas to seek employment opportunities in cities may hamper efforts aimed at achieving sustainable construction. This is a universal phenomenon occurring in many developing nations.

It is because the land prices in cities are relatively expensive, coupled with the need for dwellings that migrants have no choice but to set up their dwellings along the river banks. This creates a bad image and in the longer run social difficulties will arise, with the stark contrast between luxurious buildings on the one hand and poor dwellings on the other.

In fact no-one wants to live in such a situation. They should prefer to live in rural areas where cool and shady villages still exist.

Law no. 22 dated 1999 concerning autonomous regions may develop into a new paradigm for encouraging the migration of people back to their original settlements.

This is due to the fact that construction activities will be concentrated in the second level region (Kabupaten). Such measures will create employment opportunities in the region in the near future.

And should Law No. 22 be strictly implemented, then overall sustainable national development could be achieved.

SOUTH KOREA

The Korean government established a Pollution Prevention Act in 1963 in order to prevent further environmental deterioration.

Entering the 21st century, environment regulations in South Korea are becoming stronger both at home and abroad pursuant to the regulations on the green movement set by the WTO and OECD, as well as multilateral international environmental agreements. The Korean environmental industry also faces a new stage of development.

Accordingly, nowadays the Korean government is investing a lot of capital for the promotion of growth in the environment. The construction industry is also trying to observe the regulations relating to the environment for the advancement of the quality of human life by maintaining harmony between man and his natural environment.

The construction industry and the environment

The construction industry in South Korea is making a significant contribution as one of the key industries for the economic operation of the country, that creates new opportunities for employment and alleviates stagnant economic activities.

At the end of 2000, the industry accounted for 8.2% of GDP and the aggregate number of employees in the construction sector reached as many as 1,581,000 persons, a share of 7.5% of total employment of 21,061,000 persons in all the industrial domains.

In particular, the Korean construction industry has played the key role in the expansion of the nation's infrastructure, such as the high-speed railroad, new town building and information technology networks, as well as in the enhancement of the quality of the people's livelihood, including fresh and pleasant living environments and welfare.

In spite of the above-mentioned contribution, since a construction industry consumes a lot of natural resources it causes a conflict between exploitation and management of natural resources on the one hand and serious imbalances in the natural environment on the other, threatening ecosystems to the brink of permanent destruction.

For example, quarrying mountains for construction materials often meets with strong protests from conservationists. Over-exploitation of natural resources brings unavoidable impacts on the environment.

Realising the lack of resources and space to dispose of waste, it is important that the construction industry conserves resources, reduces waste generation, and maximises recycling efforts. This is the only way to revitalise the economy while protecting the environment.

Therefore, the Korean government decided to introduce the EPR (Extended Producer Responsibility) policy to minimise waste generation in the entire production process, from production to final treatment and disposal.

Public investment in the environment sector in South Korea increased at an average annual

rate of 16.7% from 1995 to 1998, reaching 2.7 trillion Won in 1998. Accordingly, the ratio of investment in the environment sector to GNP rose from 0.5% in 1995 to 0.7 percent in 1998, nearly equalling those ratios in Japan and the United States.

Means of implementation

To implement Agenda 21, which was adopted at the '92 Rio Conference, the Korean government introduced Local Agenda 21 in a number of regions in 1997. Through this mechanism local governments, together with citizens and industries, may strengthen the roles and responsibilities of local communities in environmental protection, by establishing and implementing environmental plans that meet local needs.

For the 21st century, South Korea is going to focus on 'Sustainable Development' and make a drastic shift in its natural environment conservation policies. Also, voluntary participation by local residents in these conservation efforts should be encouraged in order to increase awareness and understanding of environmental issues, and to foster a more constructive relationship with local residents.

To this end, the government is now moving away from its current passive, regulation-oriented environmental policies towards more aggressive conservation and management policies.

Based on its plans to implement such active and aggressive natural environment policies for the 21st century, South Korea has been revising its Natural Environment Preservation Act.

NEPAL

The construction industry in Nepal is becoming more competent, larger and responsible. Construction activities contribute about 10% to the GDP of the country. Construction also provides full-time as well as seasonal employment to a significant number

of people. Since the country is a developing one, infrastructure-related construction such as hydropower, roads, and irrigation constitute the principal construction activities.

Construction has direct and considerable impacts upon the environment on the one hand and on the other hand, the global awareness towards the preservation of environment has strongly linked environment and construction together. For developing countries like Nepal there is a great need for the development of basic infrastructure and there is also a challenge of preserving/protecting environment from possible hazards.

Construction, in general involves three main parties – the client, the consultant and the contractor. Among these three parties, the contractor, the real implementator of construction projects has almost no say in incorporating protection measures at the planning phase. However, the contractor must face the challenge of protecting the environment.

Strategies

In Nepal, most environmental problems find their origins in poverty, population pressure, wasteful production and lack of environmental awareness. Under-development and development processes are also contributing to environmental degradation in Nepal.

Many Environmental Acts and Regulations have been enacted for environmental protection. However, some of these laws are either inadequate or conflicting with each other and need to be updated and consolidated to cope with newly emerging environmental problems. Moreover, it is necessary to shift from traditional command and control types of environmental policies to market based mechanisms.

For addressing the above-mentioned environmental issues, the strategic measures to

be adopted are:

1. Carry out environmental impact assessment (i.e. Strategic Environmental Assessment (SEA) at policy, planning and programme levels. Environment assessment is presently limited to the project level. It has to be viewed from the macro and meso levels for a wider perspective of sustainable development. Environmental aspects have to be considered right from the policy level through planning and programming to the project level. SEA is the instrument for this purpose.
2. Emphasis on the biodiversity aspect at project level Environmental Impact Assessment (EIA). Integrate biodiversity conservation aspects into the existing project level EIA system applicable to water resource development projects and enforce a stringent monitoring system in order to ensure implementation of mitigation measures.
3. Implement programmes for the conservation of water resources in the upper watershed and the rehabilitation of critical land, within the framework of integrated and sustainable management of a river basin to prevent the damage and loss that affect the ecosystem.
4. Prepare sedimentation and erosion control plans and construct check dams to mitigate sediment flow on major rivers and construct gabion and retention walls with proper drainage to protect land slides and soil erosion in critically sensitive areas as recommended by the plan.
5. Carry out periodic surveys of watersheds of major rivers for establishing a benchmark database so that changes in land-use patterns and man-induced environment degradation can be assessed, and accordingly necessary corrective measures can be taken in time.

6. Implement a compulsory saving deposit scheme by the project implementing agency equivalent to environment mitigation costs to the agency and return deposit, only if mitigation measures recommended by EIA reports are strictly followed and develop a performance-based incentive system of rewarding those who comply with Initial Environmental Examination (IEE/EIA) guidelines satisfactorily whilst punishing those who do not follow the guidelines.
7. Implement integrated resource management and mobilisation of resources through people's participation in the functional watershed areas of 15 to 25 sq. km, in order to mitigate the negative impact of any development work such as hydropower and irrigation projects. Develop integrated package programmes that emphasise people's participation and appropriate technologies through conservation extension education and demonstration.
8. Effective monitoring.
9. Strong legal basis for the implementation of an environment management plan
10. Contractual obligation
11. Corruption control

JAPAN

Japan's construction industry has become a major source of waste in recent time. This waste accounts for about 20% of the total waste generated from all industries.

In view of such a circumstance, the construction industry started 'The Liaison Council of Waste Counter plan by the Eight Construction Organisations' in November 1984 for the purpose of promoting a basic policy for the proper treatment of construction waste.

The main activities included entrusting the research and the study of the proper treatment of construction waste to the Japan Waste Management & Technology Centre (Japan Industrial Waste Technology Centre) in November 1984. The results of the research and study were referred to the conference with the Ministry of Construction and the Ministry of Health and Welfare in June 1988. The association made an appeal of understanding to the authorities of the Tokyo Bay Phoenix Plan in May 1988, playing the role of mediator for the construction industry in the matter of proper treatment of construction waste.

After the enforcement of the Recycling Act in October 1991, it has become mandatory for the construction industry to make almost all of construction waste safe and harmless, as well as to make practical use of the limited resources while playing an important role of structuring a recycling society. The final volume of waste requiring final disposal is more than 40% of all waste with the total volume of the discharge amounting to about 20% of all industrial waste. Promotion of reuse as a countermeasure for construction by-products is also being carried out by the construction industry, as it is expected to accept recycled products from other industries.

Other activities involved include 'Vision of the Construction Industry Environmental Action.' This was put together and published in October 1998 by ten construction associations. 'Independent Action Plan for Preservation of the Environment in the Construction Industry' was prepared and published in November 1998 by three construction associations. The Ministry of Construction and eight construction associations jointly established the Construction Recycle Promotion Council in November 1998.

'Construction Recycling Promotion Plan '97' is aimed at zero waste requiring final disposal as the ultimate future target. But the immediate target is to reduce it by half by the year 2000. For that purpose, it is to accomplish 10% control of the estimated volume of construction waste and recycle 80% of the final volume thereof.

AUSTRALIA

Following the announcement of the Kyoto Protocol, the building and construction industry was tasked by the Prime Minister of Australia to pursue environmentally sustainable building processes and practices that would reduce greenhouse gases thus providing long-term benefits for future generations.

Governments at all levels and industry stakeholders have moved to identify how the challenge can be met. At a Commonwealth level, the Department of Environment and Heritage and its various agencies, including the Australian Greenhouse Office and Environment Australia, have developed protocols and programmes, with industry to enable the industry to meet the challenge. For their part, state and territory governments have established agencies to develop policy and programmes to ensure the industry adopts best practice principles.

As part of the response to the Prime Minister's challenge various initiatives have been commenced to create and adopt both mandatory and voluntary codes of practice. The Australian Greenhouse Office has struck a Memorandum of Understanding (MOU) with the Australian Building Codes Board to incorporate minimum standards in the Building Code of Australia for energy efficiency measures in buildings. These measures are intended to achieve significant improvement and eliminate worst practice, thereby reducing greenhouse gas emissions, while avoiding excessive technical and commercial risks and unreasonable costs.

In concert with that initiative, the Australian Building Energy Council is pursuing the development of voluntary codes of practice that will demonstrate the commercial benefits that flow to those in the procurement chain and of course clients.

The result of these measures places enormous demands on the development of education packages that will enable all stakeholders to acquire skills and knowledge in delivered sustainable environmental and energy solutions. A number of the industry associations have products in the marketplace and are working with Government to develop additional tools to influence the market to further develop these solutions.

The challenge is one that is now truly on the top of the agenda for the industry and will not diminish. To put the matter in a broader perspective, from both a global and domestic perspective, one only needs to understand that the global budget for 2001 in seeking and implementing sustainable environmental improvements is a staggering USD530 billion. Australia's share of that budget is one of the largest in the developed economies.

SRI LANKA

Sri Lanka has also initiated the South Asian Association for Regional Cooperation (SAARC)-Construction Industry Council, which attempts to share major contracts with each other in the SAARC region. It is suggested that IFAWPCA also follows these principles and ensures through its good offices to convince the member countries of IFAWPCA, to always go into partnership with domestic contractors, when the European, American and Japanese giants work in developing countries.

In turn IFAWPCA believes that the Asian region should give much more emphasis, at a faster pace, in associating the environment with construction. Limitation of availability of environmental resources was being realised, depleting the stock of energy resources,

unclean piling up of wastes and air pollution and the threat of global warming, whereby people have begun to realise the importance of having an environment protection policy for sustainable economic development.

The government of Sri Lanka has become extremely conscious of the environmental issues, and has made it compulsory to obtain clearance from the Environmental Authority, for authorisation of major infrastructure projects.

Annexe 7: Bibliography

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UNEP contribution to the World Summit on Sustainable Development

The mission of the United Nations Environment Programme (UNEP) is to provide leadership and encourage partnerships in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations. The UNEP Division of Technology, Industry and Economics (DTIE) contributes to the UNEP mission by encouraging decision-makers in government, business, and industry develop and adopt policies, strategies and practices that are cleaner and safer; make efficient use of natural resources, ensure adequate management of chemicals, incorporate environmental costs, and reduce pollution and risks for humans and the environment.

This report is part of a series facilitated by UNEP DTIE as a contribution to the World Summit on Sustainable Development. UNEP DTIE provided a report outline based on Agenda 21 to interested industrial sectors and co-ordinated a consultation process with relevant stakeholders. In turn, participating industry sectors committed themselves to producing an honest account of performance against sustainability goals.

The full set of reports is available from UNEP DTIE's web site (<http://www.uneptie.org/wssd/>), which gives further details on the process and the organisations that made it possible. The following is a list of related outputs from this process, all of which are available from UNEP both in electronic version and hardcopy:

- industry sectoral reports, including
 - accounting
 - advertising
 - aluminium
 - automotive
 - aviation
 - chemicals
 - coal
 - construction
 - consulting engineering
 - electricity
 - fertilizer
 - finance and insurance
 - food and drink
 - information and communications technology
 - iron and steel
 - oil and gas
 - railways
 - refrigeration
 - road transport
 - tourism
 - waste management
 - water management
- a compilation of executive summaries of the industry sectoral reports above;
- an overview report by UNEP DTIE;
- a CD-ROM including all of the above documents.

UNEP DTIE is also contributing the following additional products:

- a joint WBCSD/WRI/UNEP publication entitled *Tomorrow's Markets: Global Trends and Their Implications for Business*, presenting the imperative for sustainable business practices;
- a joint WB/UNEP report on innovative finance for sustainability, which highlights new and effective financial mechanisms to address pressing environmental, social and developmental issues;
- two extraordinary issues of UNEP DTIE's quarterly *Industry and Environment* review, addressing key regional industry issues and the broader sustainable development agenda.

More generally, UNEP will be contributing to the World Summit on Sustainable Development with various other products, including:

- the Global Environmental Outlook 3 (GEO 3), UNEP's third state of the environment assessment report;
- a special issue of UNEP's *Our Planet* magazine for World Environment Day, with a focus on the International Year of Mountains;
- the UNEP photobook *Focus on Your World*, with the best images from the Third International Photographic Competition on the Environment.

Sustainability profile of the Construction industry

- Achievements

- Developing countries' share of total construction output worldwide has increased from about 10% in 1965 to about 29% in 1998.
- Mature economies have uncoupled the growth in the production of CO₂ emissions in the built environment, as well as in construction and demolition waste through increased recycling, from GDP growth.
- Third industrial sector holding ISO 9000 and fifth holding ISO 14000 certificates.

- Unfinished business

- Reducing CO₂ emissions through raising the energy performance of existing buildings.
- Improving health and safety on construction sites.
- Promoting increased training.

- Future challenges and possible commitments

- Further reducing CO₂ emissions in the built environment through the development and integration of renewable energy technologies.
- Promoting the integration of environmental technologies in construction.
- Agreeing a realistic set of performance indicators against which the construction sector can benchmark its progress.

For further information contact:

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