NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY
TABLE RONDE NATIONALE SUR L'ENVIRONNEMENT ET L'ÉCONOMIE

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FP11

CANADA OFFERS SUSTAINABLE CITIES SOLUTIONS FOR THE WORLD

Discussion Paper for a Workshop
Convened by
The National Round Table
on the Environment and the Economy

Ottawa, Ontario
January 29-30, 1998

PREFACE

The National Round Table on the Environment and the Economy (NRTEE) has been working in fields related to more sustainable cities for several years. For example, in 1995 and 1996, it hosted a series of round table reviews of "environmental infrastructures", with emphasis on water and wastewater services in Canada. This resulted in a major report on the "state of the debate" in this field.

Over the year 1997, the National Round Table gave even more focused attention to the subject of sustainable cities, as the text box below indicates.

NRTEE WORK ON SUSTAINABLE CITIES, 1997

May:	Hosted international workshop *Toward Sustainable Cities in APEC: Urban Air Quality and Urban Energy Management*, to provide recommendations to the Canadian government.
June:	Helped shape discussions at the APEC Study Centre Consortium Conference
June:	Co-Chaired the Business Leaders and Local Authorities Forum of the APEC Environment Ministerial; participated as delegate to the Ministerial
	Commissioned an inventory of Canadian sustainable cities expertise.
September	Chaired workshop at FEEEP Symposium of APEC.
September	Presented at the Beijing meeting *Environmental and Economic Policies Toward Sustainable Cities in APEC*.

In organizing a workshop on "Sustainable Cities Solutions for the World", the Round Table hopes to build on this work, and on that of many other organizations, including the Federation of Canadian Municipalities, the International Council for Local Environmental Initiatives, the GLOBE Foundation, industry associations, and Federal departments and agencies such as the Canadian International Development Agency.

It aims to develop sound advice for the Prime Minister and other "Team Canada" participants on this subject. The NRTEE will focus on a Canadian strategy for teaming companies, government agencies and expert organizations to tackle the huge market opportunities associated with building sustainable cities around the globe.

Many Canadian organizations are already involved in specific projects related to marketing sustainable cities abroad at present. For example, Industry Canada has established a "Capital Projects Action Team" to coordinate government trade-promotion efforts for many different types of urban infrastructure. Moreover, the "Team Canada" approach to international markets is becoming well established, with a growing network of support programs, coupled with high-profile trade missions led by the Prime Minister. Canada's own national Infrastructure Program has been a model of intergovernmental priority-setting and cooperation with substantial environmental benefits in urban areas.

The essence of the current NRTEE endeavour lies in the rationale for creating the National Round Table in the first place: to bring together unique combinations of stakeholders in order to advance both environmental and economic agendas at the same time and to generate synergies. In the context of the recent Kyoto meeting on global climate change, and of current Canadian foreign policy commitments on a variety of fronts, it is becoming urgent to bring together all of Canada's players in this field. In everyday life, they may not get the chance to talk with each other and to speak to government about what is required to take the more integrated, turnkey approaches to urban development projects. Such integrated, multi-disciplinary teams are called for by today's global urban conditions, by International Financial Institutions, and by municipal government buyers. Unless Canada takes a more comprehensive approach in this field, it risks losing out on major capital projects and export markets to competitors from the European Union, the United States and Japan which offer both sound environmental performance and innovative financing arrangements.

The workshop in Ottawa on January 29-30, 1998 will bring together people to be part of the solution to this challenge: business leaders who have experience in delivering technologies, products and services with urban application; urban consultants with experience in working with International Financial Institutions; key city officials; urban experts from universities, institutes and other organizations; government officials from CIDA, Foreign Affairs, and Industry Canada, Environment Canada; and the financial community. The agenda is designed to ensure that all participants have the maximum opportunity to participate in formulating a strategy that, if implemented, will make each one taking part better able to carry out their respective responsibilities.

Consistent with the NRTEE mandate, the workshop results will be fashioned into recommendations by the Round Table in February, and delivered to the Prime Minister, the Ministers of Foreign Affairs, International Trade, Environment and Industry, and to all relevant government agencies. Participants will, of course, be given a copy of the proceedings and of the final recommendations for action in their own spheres of influence.

Michael Harcourt
Chair, Foreign Policy Committee, NRTEE
December, 1997

CONTENTS

1. WHAT THIS WORKSHOP IS ABOUT

1.1 Why Changes Are on the Horizon

Over the next twenty-five to thirty years, a combination of trends will be coming together to pose a new type of environmental, social, and business challenge: the challenge of sustainable cities. Its essence is very simple. The majority of the world's people will be living in cities for the first time in human history, and perhaps a third will be living in very large cities, with populations ranging up to 10 million or more. Cities will be using much more energy, water, and land than ever before, and doing so in more concentrated, land-, capital-, knowledge-, and technology-intensive ways.

Unless the governance, technologies and financing mechanisms now in use change substantially, people in cities will find their economic promise to be dramatically undercut by health, safety, environmental and social problems, on a scale which beggars the imagination. Because, as we see every day, everyone is now a part of the "global city", what happens elsewhere will affect Canadians very directly. Just one example is when a crash in the Tokyo urban real estate market pushes our dollar down, interest rates up, and casts a pall over our whole economy.

1.2 The Business Case for New Teaming Approaches

From a business perspective, the challenge ahead appears to pose requirements for:

- seamless linkages between public and private sectors, so that both aspects of urban client needs -- typically in a municipal government -- can be addressed;
- connections between "demand" and "supply" sides of urban infrastructure and buildings, so that financially viable systems can be designed and implemented;
- combined marketing of multiple products and services together, for synergies of integrated sales/project development, at lower overhead for each participant;
- combined design, implementation and financing for Build-Own-Operate, and Build-Own-Transfer projects desired by urban centres privatizing collective urban services;
- combinations of linguistic, cultural, technical and social skills and talents to interact with clients over the long periods associated with major urban projects;
- close linkages between innovation and application to assure sophisticated and demanding urban markets and clients that they are receiving the most advanced and also reliable solutions.

1.3 Canadian Experience Exists

In several individual cases -- such as the design and implementation of a rapid transit system for Kuala Lumpur, Malaysia -- Canadians can already see significant movement in such a direction. Industry associations in key sectors associated with urban capital projects, such as the Association of Consulting Engineers of Canada, the Canadian Construction Association, and the Canadian Manufactured Housing Institute have already created "export councils" to link company efforts and market Canadian services and products more effectively in major urban centres. The Canadian International Development Agency and International Development Research Centre, after decades of focusing mainly on rural needs, have placed urban conditions and requirements firmly on their policy agendas and investment priorities.

These are all very important building blocks, and form the basis upon which to construct a new type of combined Canadian business venture which:

- establishes or strengthens long-term personal, business and professional relationships in key urban centres around the globe;
- links individual trade missions with these relationships, resulting in friendly faces as each new mission arrives;
- creates "beach-heads" of innovation in given urban markets through combinations of demonstration projects, training, and locally-based Research and Development to adapt Canadian technologies to immediate requirements as well as devising innovations unique to their milieu.

1.4 Why Teams Are Not Happening Automatically

Saying these things is easy. *Doing them* is considerably more difficult for a variety of reasons: competitors in the domestic Canadian or North American marketplace may find it difficult to work together elsewhere; different professions and disciplines usually find it harder to work with others using different jargon and basic conceptual approaches; Canadians are already dispersed across the second largest country in the world, and may find it too costly and demanding to fashion and maintain alliances over thousands of kilometres; comparatively few Canadian companies have the "deep pockets" it may require to enter and stay in a new international market for the long haul; it may be easier to stay close to home, whether alone or in consortia, because of the familiarity and lower risks of the United States market. Because of the similarities of American political, economic and social systems, it may seem much less necessary to offer multi-faceted packages there.

1.5 Canadian Teams Have Already Done Much

Nevertheless, Canada's own history is full of examples of team-building for large-scale and/or technically very demanding infrastructure and building projects, not previously attempted, and not obviously within the capacities of a small country in population terms. These include: the national railway system, hydro-electric power grids, the nuclear industry, advanced telecommunications systems, advanced urban transit systems, energy-efficient buildings and associated codes and standards.

In several of these cases, Canadian exports to overseas markets have also been facilitated by public-private and cross-sectoral partnerships. In each instance of export success as well, there have been *environmental marketing considerations which have helped to distinguish Canadian companies from their competitors.*

2. MEETING THE CHALLENGES OF "SUSTAINABLE CITIES"

2. Origins of "Sustainable Cities"

The 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janiero, Brazil placed the concept of environmentally sustainable development, including sustainable cities on the international agenda. That conference emphasized not only the environment but also the social and economic components of development. It was based on the "Bruntland Commission" definition in *Our Common Future*: "Sustainable development is development which meets present needs without compromising the ability of future generations to meet their own needs."[1]

One more recent report notes the following characteristics of sustainable urban development most frequently mentioned in the literature:

- ensuring that future generations do not face major burdens generated by today's population;
- meeting basic human needs of present generations in an equitable way as among social groups and geographic regions;
- minimal impact on the natural environment through efficient use of resources, respecting the "carrying capacity" of nature, and favouring renewable over non-renewable resources;
- long-term economic development;
- preservation of economic, biological and cultural diversity;
- assurance of individual well-being, including both health and education.[2]

Such a broad definition is somewhat helpful, but may not give business and industry planners enough specific guidance. What does a sustainable city look like in concrete terms?

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[1] United Nations Commission on Environment and Development, (New York: Oxford University Press, 1987).

[2] See Virginia W. Maclaren, *Developing Indicators Of Urban Sustainability: A Focus On The Canadian Experience* (Toronto: ICURR Press, 1996), p. 1.

2.2 Different Types of Cities

At any given point in time, we can see what appear to be sustainable and unsustainable cities before our eyes:

- Some, like Toronto, London, Seattle and Singapore, are ranked as among the best in the world in which to live and do business. Their wealth solves many problems, but they cannot be repeated in much of the world, and each continues to have undeniable blemishes as well.

- Some, like St. Petersburg, Sao Paulo, and Istanbul, have immense historic and geographic assets, but also large environmental and social problems to resolve, which they seem to be on the way to doing.

- A minority, like Johannesburg, Sarajevo, Guatemala City, and Hanoi must overcome immense social and reconstruction difficulties before their future can be regarded as assured. Trends could go either way, depending on local leadership and overall political and economic trends. In some cases, urban crime is becoming an integral part of the urban culture, leading to vicious circles of breakdown and violent response.

- Too many, like Kigali, Khartoum, Baku and Baghdad are barely functioning for their residents, impose huge costs on them, and require immense investments to offer even the most basic services.

To move cities upward through these categories requires mutual learning on an unparalleled scale, coupled with clever application of resources, democratization, privatization in some cases, and engagement of all the creative and vital energies of which cities are capable.

2.3 A More Practical Definition

Environmental impacts can be prevented or mitigated through integrated urban approaches. Desired results include: conservation of natural habitats and land; maintenance of natural water courses; reduced consumption of energy, water and materials; reduced air pollution; reduced water-borne waste and runoff; reduced solid waste production; reduced or carefully managed human activity in pristine rural and wilderness areas; elimination of toxic releases in the environment. In addition, damaged ecosystems such as polluted rivers and airsheds can be re-established.

Key stakeholders in achieving these results include: private sector providers of products, technologies and services; investors, bankers and International Financial Institutions; non-governmental and community organizations; urban residents; national and local governments and government agencies.

2.4 Bringing Together the Elements of Sustainable Cities

Capital requirements of future urban development are so large -- in the trillions of dollars -- that most financing will have to be provided by the private sector; neither multilateral financial institutions or bilateral aid agencies can provide financing on such a scale. Local governments will need to play a much larger role and to develop and exercise the necessary authority and capacity to guide investment in the future. Clear regulatory frameworks will be required to dampen land speculation and to provide the context for efficient, equitable, functional and sustainable infrastructure development.

It is impossible to judge in advance when the point of "sustainability" is reached, only to measure progress either toward or away from it. It is clear that trends toward sustainable cities can be fostered by consideration of the full economic as well as environmental and social costs of continuing current practices.

Actions leading to more sustainable cities may include:

- Using planning tools, organizational frameworks, and financing mechanisms for multi-sectoral investments, so different systems are considered in relation to each other from the outset, e.g., buildings *and* infrastructure.

- Strengthening the capacity of municipal institutions to provide good, effective governance.

- Adopting new technological, financing and organizational choices for urban region and local infrastructure systems, including energy supply, water supply, transportation, and sanitation which decentralize provision of services.

- Purchasing materials from suppliers which meet environmental standards and produce materials with recycled content, "waste" materials, etc.

- Adopting energy and materials-efficient urban construction processes.

- Implementing new choices for energy-efficient building design and technology.

- Applying creative project-scale financing mechanisms, such as those which allow future savings to be captured for today's investment.

2.5 Criteria for Sustainable Urban Investment

Sustainable investment in cities would appear to be that which:

- *Designs out* potential environmental liabilities, by managing project construction to enhance public health and safety near sites, and reduce toxic and hazardous substances in infrastructure operation.

- Offers *clear and supportive policy environment for private investment*, by reducing risks associated with clean-up and other environmental liabilities, and avoiding private sector uncertainty and delay through lengthy and contentious environmental assessment procedures.

- *Assures financing from International Financial Institutions and other investors*, increasingly contingent on adequate provisions for assessing and mitigating environmental impacts.

- *Speeds up projects* throughout their life cycle, minimizing post hoc regulation, and reducing lengthy and complex environmental assessment procedures through improved project pre-planning and design.

- *Increases effective communications* between public and private sectors by developing and using engineering and building principles and best practices which reflect continuous dialogue about economic, political, social, and environmental needs and requirements.

The above criteria can be expanded to emphasize community control rather than the traditional model of rigid, hierarchical government control. A ten-step community-based model would include the following principles:[3]

- Within all cities in the developing world, two interdependent circuits exist - the formal (within planned confines) and the informal (outside of those confines).

- The town system, based on conventional technology, is best operated by either a municipal authority or a private firm sanctioned by this authority, on a full cost-plus recovery basis.

- Irregular land tenure issues should be resolved within the informal residential sectors of the city.

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[3] Charles L. Choguill, "Ten Steps to Sustainable Urban Infrastructure", in *The Urban Age*, Vol. 5, no. 2, 1997, pp. 22-23.

- Informal infrastructure should be designed and built using external technical assistance only as required and be planned with an eye toward future upgrades to integrate with the town system.

- Informal infrastructure built by the local community should be under its control.

- The community must maintain the technology it selects for its informal sector infrastructure.

- The lowest-income users must be able to afford the informal infrastructure.

- Informal sector infrastructure must be socially acceptable to the community.

- To achieve city-wide coverage of infrastructure in the informal residential sector, government should adopt the role of facilitator and enabler rather than provider.

- Local and international non-governmental organizations can play a key role in assisting communities to develop infrastructure systems.

2.6 Specific Dimensions of Sustainable Urban Development

Sustainable communities can also be described in fiscal, social and environmental terms:

- *fiscally*, the costs of building, operating and maintaining new communities and their supportive infrastructure and services are affordable, having regard to other spending priorities, and will not become a burden on future generations;

- *socially*, communities are designed to be socially diverse, adaptable to changing lifestyles and to further the objective of providing all residents with access to affordable housing, education, health care, essential goods, public amenities and services, such that their basic needs are met; and

- *environmentally*, communities are designed to minimize air, water, and soil pollution, reduce resource consumption and waste, and protect natural systems that support life.

3. THE SCOPE OF NEEDED FUTURE INVESTMENT

3.1 Investment Implications of Urban Growth

From 1950 to 1990, urban populations grew by 200 million to over two billion.[4] By the year 2000, the world's urban population is expected to reach 2.98 billion and by 2025, 8.29 billion. The urban transformation of the world will result in one in four of urban dwellers living in cities of over 500,000 inhabitants, and one in ten will live in a rapidly growing number of "mega-cities" of over 5 million residents. In 1995, 28 of the world's 38 cities with more than 5 million inhabitants were in developing countries. By the year 2015, the number will be 59 of 71 such cities.[5]

These urban populations will be straining the limits of ecosystems and existing urban services. The situation is already dire. Today, 25 percent of urban dwellers in the developing world do not have access to safe water supplies. Fifty percent lack adequate access to sanitation facilities. By 2000, more than 600 million urban people will suffer from inadequate sanitation and 450 million from unsafe drinking water.[6]

While the rapid growth of cities and the human population may seem like an insurmountable looming challenge, the real challenge lies in very small steps. We cannot tackle global warming on an individual basis when it is too large. We can only work together on a small scale to achieve great things collectively. Canadians can look at the way in which they do things and continue to emphasize the things they do well. We can examine our strengths and focus our efforts on maximizing these strengths.

The core problem may be rapid population growth in specific locations rather than the fact that society is becoming more urban. Urbanization can a make positive contribution to solving environmental problems. The paradox is that urbanization has resulted in a sustained decline in birth rates and is helping to stabilize the world's population. Growth rates are slowing down in the largest cities, with natural increase predominating over in-migration.

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[4] Herbert Girardet, *The Gaia Atlas of Cities.* (London: Gaia Books, 1992), p. 68.

[5] *United Nations, World Urbanization Prospects: The 1994 Revision*, United Nations, New York, 1995.

[6] Ismail Serageldin. "Welcoming Opportunities" *The Business of Sustainable Cities: Public-Private Partnerships for Creative Technical and Institutional Solutions.* Environmentally Sustainable Development Proceedings Series No. 7, (World Bank, 1994) p. 1.

Urbanization is also linked to the transformation of social values, improved education, and female labour force participation. Cities concentrate populations rather than dispersing people over large areas. By locating people and the means of production in a smaller space, transportation costs are reduced and land use is minimized. Well-managed cities can also have improved sanitary conditions that contribute to a healthy population. The challenge is to build and manage socially and environmentally sustainable cities, so that urbanization can become a part of the development process.[7]

Whereas urbanization is not the core problem for the environment, urbanization does create stressful living conditions. The high growth rate of cities dramatically impacts the health of the population and places a stress on its physical infrastructure. More people means faster deterioration of bridges, tunnels, buildings, water and sewage systems. The high concentration of pollutants in cities increases the vulnerability of people's health. Exhaust fumes fill the air, effluents seep into drinking water supplies, and toxic chemicals may be poorly disposed of. The urban poor usually suffer the most as they are most likely to rely on impure water sources, the least likely to have access to municipal sanitation services, the most likely to live along heavily travelled roads and to breath exhaust fumes instead of clean air.

Residents of cities also often have little awareness of the way in which their consumption affects the earth. The purchase price of commercial products and processed foods and water do not usually reflect the environmental costs of urban consumption patterns. Urban areas are at the centre of fossil fuel consumption. The energy that goes into supporting people in cities is at least a hundred times greater than the natural flow of energy through unmanipulated ecosystems. High energy consumption results in acid-rain damaged forests, global warming, and air pollution generally.[8]

Urban dwellers have become dependent on cars as well as other fossil fuel consuming vehicles. Cars have transformed urban environments making possible urban sprawl based on large private plots and detached houses. Society pays a heavy price as a result of noise pollution, vibration, accidents, demand for road and parking space, and especially exhaust emissions. The following table demonstrates the capacity, costs and emissions of various modes of transportation.[9]

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[7] See Polèse, Mario, "Urbanization and Development", in *Development Express*, Issue no. 4, 1997, pp. 1-7 for more on the debate concerning the role of urbanization in economic development.

[8] Girardet, p. 86.

[9] Gilbert, Richard, *Reducing Urban Air Pollution in APEC Economies* Toronto, Canada, 1997, p. 23.

Mode of transport	Persons per hour per lane	Cost/ passenger-km (1990 US$)	Emissions / passenger-km (grams)
1. WALKING	1,800	0.00-0.001	0
2. BICYCLE	1,500	0.0001-0.01	0
3. MOTORCYCLE	1,100	0.03-0.15	27.5
4. CAR	500-800	0.12-0.24	20.0
5. BUS	10,000-30,000	0.02-0.08	0.9-1.0
6. LIGHT RAIL	20,000-36,000	0.10-0.15	0.2-4.4
7. HEAVY RAIL	50,000-70,000	0.10-0.25	0.2-5.0

Air pollution impacts Canadians who increasingly have respiratory problems. For example, 20% of respiratory cases admitted to hospitals in the summer in southern Ontario are pollution related. In cities such as Bangkok, approximately 1 in 8 people suffer chronic respiratory problems caused mainly by the burning of fossil fuels.[10]

Cities also produce vast amounts of gaseous, liquid and solid waste. Household wastes are compounded by industrial pollution which can have a long-term effect on the health of the environment. The food consumed by urban dwellers contains nutrients which can replenish the land. Although human sewage is a valuable asset, sewage treatment systems dispose of waste rather than recycle it. Most of the food eaten in cities also comes in packaging which contributes to the waste problem.

Urban waste often includes contaminated effluent that are dangerous to living beings. Our water is being polluted by some 20-70,000 manufactured chemical substances including phenol, cyanide, arsenic, heavy metals, sulphates, and chlorine compounds that all build up in body tissues, causing disease and death.[11]

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[10] Speech by Sergio Marchi, Minister of the Environment, June 8, 1997.

[11] Girardet, pp. 94, 100.

Deforestation is another consequence of urban consumption. Cities are the major consumers of charcoal, timber and pulp which are often imported. It is estimated that the demand for forest products and land has reduced the earth's forest cover from 90 per cent in ancient times to less than 25 per cent today.[12] Large scale deforestation has led to substantial increases in soil temperatures and a significant loss of ambient moisture.

As urban populations grow, urban crime rates also tend to grow. The links are not simple, however, since urban violence is influenced by a wide range of political, social and economic factors. Nonetheless, a growing tendency toward criminal violence in many Latin American cities occurred, not as a result of angry rural migrants to cities, but because of the rising expectations of urban-born job and status seekers. When opportunities for urban advancement are few, studies suggest that better-educated, urban-born males may turn to violence. Without fast economic expansion to meet the demand, feelings of relative deprivation are likely to rise.

Economic recession and readjustment, declining state capacity, and growing demands for democracy can contribute to the potential for conflict and violence. Cities become the focal point for economic and social pressures. A general breakdown of societal norms and state legitimacy could also help translate individual or gang violence into broadly based movements against the state. Criminal violence does not necessarily lead to organized political violence, but it may be an indicator of a state's inability to cope with the demands of a growing urban populace.[13]

3.2 The Investment Opportunity

Rapidly growing cities represent an investment opportunity in urban infrastructure. The expanding economies of East Asia have led the developing world in total international finance for infrastructure. In 1996, approximately US$12.7 billion in international capital flowed into East Asian infrastructure, absorbing just under half of the US$27.4 billion in infrastructure finance that went to all developing countries.

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[12] Girardet, p. 88.

[13] Peter Gizewski and Thomas Homer-Dixon, *Urban Growth and Violence: Will the Future Resemble the Past?* Peace and Conflict Studies Program, University of Toronto. utcat.library.utoronto.ca/www/pcs/eps/urban/urban3.htm

The trend is toward private capital flows to new projects. Of the flows to East Asia, US$9.3 billion flowed to private projects in 1996, and public projects fell from about $5 billion to just over US$3 billion in the same year.[14] Between 1993 and 1995, private participation in infrastructure in developing countries doubled from about US$17 billion to over US$35 billion.[15]

All of these projects are bound to have substantial environmental impacts, especially when coupled with the industrial, commercial and residential development they will foster and underpin. It is safe to assume there will be at least $4 trillion worth of construction activity relating to both infrastructure and buildings within the next ten years.

Worldwatch Institute Senior Vice President Christopher Flavin says that global environmental health lies in the hands of eight "environmental heavyweights", accounting for 56% of global population, 59% of economic output, 58% of carbon-dioxide emissions, and 53% of forests. Asia Pacific members are: China, Japan, Indonesia and the United States.

Growth in large and intermediate cities will generate a tremendous demand for housing and community infrastructure. As a more defined middle class develops, demand for higher quality housing with more community amenities will increase. Major investment will occur in new construction, as well as in upgrading existing housing and community infrastructure.

Urban population growth between 2000 and 2025 is estimated to increase from 2.92 billion (48% of world's population) to 5.07 billion (61% of world's population). An increase of 2.15 billion people averages out to 538 million new homes.

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[14] Harinder Kohli, Ashoka Mody, and Michael Walton. "Making the Next Big Leap: Systemic Reform for Private Infrastructure in East Asia." *Choices for Efficient Private Provision of Infrastructure in East Asia.* (Washington, DC, The World Bank, August 1997), pp. 1-2.

[15] International Finance Corporation. *Lessons of Experience: Financing Private Infrastructure.* (Washington, DC: The World Bank, September 1996), p. 12.

Based on an estimated household growth in the range of 200 million in the Asia Pacific region alone over the next 25-30 years, the following illustrative kinds of market demand are likely to exist:

- 2,000 large-scale water treatment facilities, or 80,000 small-scale "package" plants.
- 250,000 new urban school facilities.
- 8,000 new community recreational and cultural facilities.
- additional road systems and parking for 12.5 million additional vehicles.
- 2.4 billion residential doors.
- 1.6 billion residential windows.
- 20-40 million residential water heaters.

3.4 Limiting Environmental Consequences of Investment

As cities begin to invest in new infrastructure to meet the growing demand, the impact on the environment will also be magnified. The transformation of society will lead to the destruction of habitats and diminish the earth's capacity to maintain a diversity of life forms. In order to be sustainable, investment in infrastructure has to be directed in ways that minimize this impact.

3.5 The Challenge of Governance

One of the challenges facing many cities today is effective governance. Corruption and incompetency create obstacles to the ability of societies to introduce new technologies. The paradox is that corruption and incompetency tend to grow rampantly in those countries which face the bulk of urban growth.

Environmental quality requires institutions which can effectively carry out the functions of governance. Institutional strengthening must be a part of urban development if environmental quality is to be addressed. Effective governance can be viewed from the following institutional benchmarks (i) geographic coverage; (ii) sectoral coverage and internal integration; (iii) vertical integration; (iv) autonomy; (v) articulation; and (vi) functional definition. These are the areas in which intra- and interorganizational strengthening can be focused to improve governance. Ensuring accountability and transparency in urban management will strengthen the capacity of local governments and increase public support.

4. CANADA'S ROLE, OPPORTUNITIES AND MARKET NICHES

4.1 Canada's Foreign Policy Response

With the world's urban population expected to comprise 48% of the world's total population by the year 2000, the urban environment is emerging as an important aspect of Canada's foreign policy. The Department of Foreign Affairs and International Trade has promoted sustainable cities as part of the Asia Pacific Economic Co-operation (APEC) agenda. This region is important considering that four of Canada's top 10 export markets are APEC members.[16]

Asian cities have among the world's highest levels of air pollution, in large part because infrastructure has not kept pace with rapid development. The Asian Development Bank estimates that over the next 25 years, nearly US$7 trillion will have to be invested in Southeast Asia for infrastructure to cope with the effects of urbanization. Infrastructure requirements will include energy, telecommunications and transportation systems, as well as low-cost sustainable housing, water treatment and waste management.

Canada is committed to promoting the importance of the environment and sustainable development in all APEC trade and investment activities as a means of achieving APEC's long-term goal of sustainable growth and equitable development. The APEC environment ministers agreed to an Action Plan during their June 9-11 meeting in Toronto. A key element of the Action Plan adopted at the ministerial meeting was the promotion of sustainable cities through pollution prevention and control and the development of environmentally sustainable infrastructure. A number of measures aimed at encouraging investment, increasing the use of technology, and strengthening co-operation between public and private sectors were adopted.

The mandate of the Canadian International Development Agency (CIDA) includes supporting sustainable development in developing countries in order to reduce poverty. Although urban development has never been one of CIDA's specific programming priorities, addressing urban poverty is an important part of this mandate. To achieve this, CIDA focuses on helping aid recipients help themselves by building the capacity of developing communities to be self-sustaining, and by strengthening local institutions.

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[16] Department of Foreign Affairs and International Trade. "APEC Environment Ministers Agree to Take Action on Sustainable Cities." *CANADEXPORT*. July 25, 1997

CIDA's six programming priorities include the following:

- promoting good governance through urban management;
- empowering women and their full and equal participation in political, social and economic life;
- helping urban and rural municipalities to improve land management and delivery systems for basic services: health care, education, family planning, nutrition, clean water and sanitation and affordable housing;
- helping equip cities with environmentally sound infrastructure and utilities such as clean water, telecommunications, energy, roads and waste disposal;
- developing the urban private sector to improve the process of employment and income generation as well as commercial links within and between cities;
- supporting programs that help the poor to better protect their physical environments while encouraging local authorities and citizens to work together for a sustainable future.

Based on the principal strategies adopted by the City Summit (Habitat II), CIDA developed a framework for urban assistance which targets different levels of intervention:[17]

- National level - create enabling frameworks for sustainable urban development

- Sub-National level - mutually strengthen support to urban and rural areas

- Municipal level - develop capacity for municipal good governance, promote democratic urban management and broad-based participation of citizens and their communities in decision making and in implementing and monitoring human settlement strategies;

- Community level - fight urban poverty and exclusion.

CIDA's efforts have focused on investments in physical urban surroundings, primarily water and sanitation systems, construction/building materials and other physical infrastructure. Spending on social infrastructure projects, including primary health services, nutrition, family planning, and income generation, has grown from 12% of programming in 1984/85 to 40% by 1994/95.

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[17] *Background to Development: CIDA and "The City Summit"* Canadian International Development Agency, October 1996.

CIDA's Bilateral and Partnership branch accounted from 1,900 of the 2,100 urban development-related initiatives, including over 1,100 projects funded through the NGO division of the branch. CIDA's initiatives in urban cooperation are based on the expertise of its Canadian partners in areas such as planning and managing cities of all sizes, inter-municipal cooperation, habitat, institutional and technical support, training for municipal officials, counterpart exchanges, and applied research.

The innovation in CIDA's approach is to not only promote international cooperation in cities but also include new forms of partnerships directly involving local authorities and their constituencies. The concept of "decentralized cooperation" involves the adaptation of Canadian urban experiences and exchanges expertise to programmes that mobilize local energies in overseas cities.

4.2 Canada's Practical Response

Canada is poised to take advantage of the opportunities opened up by the immense growth taking place in cities. Canada has the ability to market comprehensive packages of skills, information, technologies and products needed to develop urban regions in a more sustainable manner. Based on its own experience of the importance of sustainable practices, Canada is developing a role and market niches to meet the growing demand.

Canadians appreciate the fact that export earnings help to pay for environmental protection and sustainable resource development. They are also increasingly aware of the need to shape and manage resource-processing and manufacturing much more closely from an environmental standpoint. Thus, concerns about the sustainability of urban regions are closely allied to rural interests in resource conservation and development. More narrowly "urban" issues such as water supply, transportation and housing are intimately connected with the drive toward "cleaner", safer and more environmentally benign industrial production in both obvious and subtle ways.

Recognition of this fact shows up in the Canadian focus on the whole sequence of building cities. Experts consider how planning and design, selection of building materials, efficiency of construction processes, and management of urban infrastructure and building operations can all work together. To link these activities, they are using new tools of increasing sophistication, such as the "TARA" software program developed by a Vancouver company for assessing the environmental impacts of alternative community designs.

Relevant CIDA activities include: knowledge transfer of urban planning and environmental management through the Canadian Universities Consortium and Asian Institute of Technology; training and housing project development services for housing cooperatives in Zimbabwe through the Rooftops Canada Foundation; assistance in developing municipal strategies for local economic development in Hungary; and supporting FCM's inter-municipal cooperation program with exchanges between Canadians working at the municipal level and their counterparts in developing countries.

4.3 Canada's Credibility

Convincing people in other countries to buy Canadian may not be an easy sell given Canada's environmental performance. Canada is one of the highest resource-consuming countries with more garbage produced per capita than most. In a large country with a cold climate and a widely dispersed, small population, Canada tends to be very resource intensive. Canadian geographic conditions create the need to heat buildings and homes and to transport goods and people over large distances. On the other hand, while Canada has significant environmental impacts measured on a per capita basis, its large size and low population density mean that its global environmental impacts are comparatively small.

4.4 Canada's Unique Strengths

In the realm of building and maintaining more sustainable cities, Canada's sectoral expertise includes power and energy equipment and services, pulp and paper, telecommunications, information technology, transportation (aviation, railway locomotives, light rail transport, etc.) and ground water drilling.

Canada also has comparative advantages in many sectors of municipal life. Its expertise in urban planning and management, as well as in infrastructure services and maintenance is recognised worldwide. Canada also enjoys a solid reputation in decentralized municipal systems; urban environmental management; the democratic management of municipal life; state-of the art technology tools, such as land tenure systems and geographic information systems, and the complex management of large cities. Canada's expertise in land-use management can also be of practical relevance for urban managers in developing countries and countries in transition. [18]

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[18] *CIDA and Cities: Toward Sustainable Development of the Urban Environment*, Canadian International Development Agency, 1997, p. 6.

Canadian-owned companies are part of Canada's unique capabilities to address ever-growing urban problems. The management and planning of major urban regions requires experience in intensification, compact expansion, regeneration of the natural environment, community development, agricultural planning, infrastructure design, and structure planning.

5. OPTIONS FOR MOBILIZING CANADIAN CAPABILITIES

5.1 Current Teaming Efforts and Business Strategy

There are numerous teaming efforts already established in Canada that provide an important base to the "Green Team" Canada approach. Their experiences provide valuable examples of how to go about marketing Canadian goods and services internationally. Typically, however, these teams originate in the private sector. There is a need to expand these teams to incorporate both private and public actors. Moreover, expanding the teams to include a full range of technologies can build on what already exists.

One example of a successful private sector teaming approach is Construct Quebec which acts as an umbrella company for variety of Canadian firms. Construct Quebec includes manufacturers of telecommunications equipment, fire-proof building materials, doors and windows, flooring, fireplaces as well as modern office buildings. This strategic alliance helped open doors for over 19 Canadian companies to the Russian housing market where the potential market for Canadian exports is quite large. The team is industry specific, however, and lacks any substantive emphasis on the life-cycle of building materials and energy-efficiency.

The Export Development Corporation (EDC) provides a business teaming approach to help Canadian businesses interested in exporting. EDC established the Emerging Exporter Team and the Information Technology Team in March 1995. In the same year, EDC launched six other industry sector teams including: base and semi-manufactured goods, consumer goods, engineering and professional services, forestry, industrial equipment and transportation.[19]

Each business team is supported by a range of expertise to provide one-stop shopping and to help companies make quicker decisions than in the past. Country specialists provide in-depth analysis of foreign markets, including political, economic, legal, financial and cultural aspects. The emerging exporter team offers a package of services including risk management, insurance and financing services in order to boost assistance for smaller exporters.

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[19] EDC. "EDC to Launch New Business Teams." *EDC Today.* Ottawa, Fall 1995, pp. 4-5.

The Canadian government's current business strategy also emphasizes the teaming approach. The Department of Foreign Affairs and International Trade now has in place a Team Canada strategy to encourage international business development. Team Canada trade missions have demonstrated the viability of private sector and government cooperation as a means of establishing contacts and business deals. Since its beginnings in 1994, these missions have generated over $22 billion in business contracts.[20]

This business strategy offers the following services: export training, counselling, up-to-date market information and intelligence, financial assistance, contact information and risk assessment as well as sponsoring trade fairs and missions. Such services are key to opening doors for Canadian exports. The primary emphasis of the Canada Business Service Centre is on supporting first contact opportunities between Canadian businesses and businesses abroad.

Canada can build on this approach by working to ensure that other countries can readily accept Canadian products. This requires some harmonization of codes and standards as well as marketing Canadian products in a country-specific manner. Building a critical mass in foreign countries depends on the receptivity of those countries. Without the ability to use or comprehend the value of Canadian products, these markets will continue to be difficult to enter.

As part of Canada's efforts to improve market access for trade in goods and services, one priority is reducing technical barriers to trade. Under the World Trade Agreement on Technical Barriers to Trade, Canada is examining practical issues such as conformity assessment procedures and equivalency issues to facilitate access to markets and lower the costs to producers and exporters. The WTO helps define the international rights and obligations of members with respect to the application of such measures as mandatory technical regulations and voluntary standards.[21]

Another critical aspect of Canada's business export strategy is the promotion of key linkages among exporting businesses. The National Strategic Framework for Canada's Housing Exports provides an example of the type of policy that is needed to expand Canada's export opportunities.

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[20] Department of Foreign Affairs and International Trade. *Team Canada Trade Missions*. www.dfait-maeci.gc.ca/trade/infoexport/team_canada/missions-e.htm, September 1997.

[21] _____. *Canada's International Market Access Priorities* www.dfait-maeci.gc.ca/english/trade/mktx1.e.htm, 1997.

The strategy promotes linkages among the residential construction industry, manufacturers of building products and housing components, developers and other service providers such as architects, engineers, urban planners, property managers and consultants.[22]

The framework contains some important elements to improve the industry's performance. It seeks to establish a National Housing Team to co-ordinate housing exports and to develop detailed sector-and market-specific strategies; to increase the industry's export readiness, with priority being given to firms that have already taken steps in this direction and are on the threshold of being export ready; and to encourage foreign acceptance of Canadian codes and standards.

5.2 Creating a Team Canada Approach to Sustainable Cities

A "Green Team" Canada strategy could take this approach a step further. Currently, Canada divides its products and services into 29 national sector teams. Six of these teams which are vital to cities and specifically to creating sustainable cities are as follows: electrical power equipment and services; rail and urban transit; information technologies and telecommunications; environmental industry; building products; and construction, architectural and engineering services. Rather than approaching each industry individually, the idea is to cut across industry lines to promote a package of services and goods that benefit sustainable cities. It creates a more effective and holistic action plan to target cities with a range of technologies and services instead of taking a piecemeal approach to exporting.

The six sectors listed above already form the basis of a "Green Team" Canada approach and can be marketed abroad in a manner that underscores the integration of products and services. In other words, there are linkages not only within an industry sector, as discussed above in the national housing strategy, but also between industry sectors that contribute to sustainable cities. Local power generation systems are linked to energy efficient buildings thereby reducing the need for large polluting systems. Sustainable forest practices are a prerequisite to sustainable construction practices. The environmental industry depends on strategic alliances with transportation companies to provide more efficient services. The importance of linking companies across industry sectors becomes particularly relevant in the environmental context.

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[22] Department of Foreign Affairs and International Trade. *CIBS '97-'98 Strategy - Construction, Architectural and Engineering Services.* www.dfait-maeci.gc.ca/englis...CIBS/ english/strategy13srescon.htm, 1997.

The electrical power equipment and services sector already emphasizes sustainable development as a means to improving its export potential. Industry Canada notes that the "need for NO_x, SO_2 and greenhouse gas-emissions technology and control systems for thermal plants has created a huge potential market for Canadian firms estimated to be worth $5 billion to $6 billion over the next five years, especially Asia." The companies in the best position to take advantage of this approach include: co-generation systems; power transmission and distribution equipment; power and distribution transformers, control protection equipment; power conversion equipment; alternate energy systems; and power-consulting engineering services.

Among the many tasks envisioned for joint electrical power industry-government action is to continue to support developing countries with the design and implementation of their energy and environmental regulatory infrastructures. This kind of effort may be more effective in a cross-sectoral approach rather than addressing electrical power needs individually. Industries such as building products also require more receptive regulatory infrastructures that also take into account negative environmental effects.

5.3 Building on the Work of CPAT

Canada's emphasis in transportation is on the urban transit equipment and freight railway equipment subsectors. This sector was identified by the Task Force on IFI Procurement as a key sector for attention by the interdepartmental Capital Projects Action Team (CPAT).

The CPAT initiative targeted several high potential countries for the industry in Asia (China, Indonesia, India, the Philippines, Vietnam) and Latin America. In these regions, there are significant opportunities particularly for passenger rail cars and buses, and freight rail equipment that are more environmentally friendly than automobiles and that service large urban areas.

The information technologies and telecommunications sector includes numerous Canadian companies with products and services that reduce energy consumption in urban centres. Geomatics services also help inform decision-makers about the environment and urban planning. The sector emphasis is on high-growth markets, particularly those in the Asia-Pacific region with large urban centres.

An increasingly important part of Canada's exporting industry is the rapidly growing environmental industry. It includes a wide range of pollution prevention and environmental conservation, control, protection, remediation and enhancement technologies, processes, products and services.

As an enabling industry, the success of Canada's environmental industry in developing efficient solutions is critical to the competitiveness of many other Canadian industrial sectors. Industry Canada supports a strategic alliance among companies with complementary strengths to form a competitive Team Canada package.

Building products is one industry sector where Canada has actively promoted cooperation among small and medium-sized companies to help them compete internationally. For example, consolidator networks combine their resources to market complementary products in a more comprehensive manner. Despite these efforts, Canada's expertise in cold climate construction and in practical, energy efficient housing has encountered significant trade impediments.

The domestic standards regulatory environment is a major factor affecting the international competitiveness of construction and building products and systems. The main geographic priorities are on countries and regions, namely the United States, the European Union and Japan, where these barriers are not as pronounced. In terms of rapid urban growth, however, many key countries are riddled with impediments. Efforts to address technical barriers under the World Trade Agreement are particularly relevant to this sector.

Finally, the construction, architectural and engineering services sector is an important player with an ability to combine specialized expertise in a multidisciplinary fashion. The companies in this sector with expertise in the development of sustainable cities encompasses residential construction, non-residential construction, consulting engineering, architectural service, urban planning, and developers. Industry Canada recognizes that there are many collective project opportunities including electric power projects, transportation systems, resource-processing plants and installations, tourism facilities and integrated urban development/new cities. This sector also has a role to play in the issues of standards, codes and research and development. Maximizing the export potential of the sector requires a greater focus on using its collective strengths in integrated project delivery.

5.4 Linking a Team Canada Approach to Privatization of Infrastructure Services

Based on Canada's experience of the past several decades the following has been learned about the most effective methods of promoting sustainable cities:

- Market forces tend naturally toward saving materials and energy, in order to reduce waste and increase earnings, although there are still tendencies to seek to leave wastes to others to clean up.

- State subsidies for urban services often have the effect of promoting or permitting pollution to continue, since older, dirtier industries are permitted to stay in business this way, and wasteful public sector practices may be continued. Full-cost pricing of such services offers a major way out of these problems, though it needs to be coupled with assistance for those in greatest need.

- Sustainable cities will be achieved through a combination of technological innovation and changes to both behaviour and institutions. City governments which are accountable to their residents are most likely to look out for their health, safety and quality of life.

- Because governments are not seeking to control all aspects of urban life, they will want to measure progress according to comparative indicators. Such indicators of progress are fundamental to accountability to the urban public.

5.5 Methods of Mobilizing Canadian Expertise

As national and local governments around the world are forced to reduce spending on infrastructure and municipal services, partnerships between government, the private sector, community-based organizations and other expert organizations are increasingly seen as crucial to urban development and management. By inviting diverse constituencies to sit at the same table and collectively define problems, a shared vision can be formulated and solutions found. The result is cities that are more economically vibrant, have greater social stability, and a healthier, more engaged citizenry.

Each sector has a distinct role to play in this process. Governments must introduce decentralization initiatives, undertake economic reforms, and liberalize policies. Non-governmental organizations and community groups understand local needs and can lend their special expertise in program implementation and service delivery at the grassroots level.

Traditionally, the role of the business sector in community development has been that of philanthropist. But businesses benefit substantially from reforms and programs that foster stable, healthy communities, and can do more than create wealth. They can also widen economic opportunity, invest in human capital, promote environmental sustainability, and enhance social cohesion. Increasingly, they are becoming equal partners and contributors in efforts to create sustainable cities.

In increasing private sector participation, structural reforms should be undertaken at an early stage to create an appropriate environment. Such reforms are needed to introduce competition, separate ownership and regulatory functions, make the system of regulation transparent and to broaden financing base.

Private sector involvement in infrastructure can be promoted in several ways. Even if the ownership and operation of infrastructure remain a direct government responsibility, the private sector can be involved in planning, construction, and maintenance of facilities. The private sector can contribute to infrastructure development by providing resources through capital markets. There is also a potential for bond financing as bonds involve lower costs, longer maturities, and wider market.

Participation of the private sector has several advantages. It provides financial resources, generates efficiency, is able to respond to market forces, and can take investment and operational decisions with speed and flexibility. Capital requirements are so large - in the trillions of dollars - that most financing will have to be provided by the private sector; neither multilateral financial institutions or bilateral aid agencies can provide financing on such a scale.

5.6 Practical Challenges

The workshop participants are invited to develop ways of addressing the following practical challenges:

- Competitors in the domestic Canadian or North American marketplace may find it difficult to work together elsewhere.

- Different professions and disciplines usually find it harder to work with others using different jargon and basic conceptual approaches.

- Canadians are already dispersed across the second largest country in the world, and may find it too costly and demanding to fashion and maintain alliances over thousands of kilometres.

- Comparatively few Canadian companies have the "deep pockets" it may require to enter and stay in a new international market for the long haul; it may be easier to stay close to home, whether alone or in consortia, because of the familiarity and lower risks of the United States market. Because of the similarities of American political, economic and social systems, it may seem much less necessary to offer multi-faceted packages there.

5.7 Ongoing Role for Municipalities

The municipal level of government can be an effective partner in making human settlements viable, equitable and sustainable since its level of administration is closest to the people. Governments must recognize the essential role of local authorities in providing services and empowering people to secure economic development, social welfare and environmental protection for their communities, and the role of international cooperation among local authorities.[23]

There are over 4,000 municipalities in Canada, ranging in size from over 3 million to a few hundred people. Many have defined environmental policies and a considerable number are consciously pursuing the agenda of sustainable development.

Cooperation at the municipal level represents one of Canada's key strengths in addressing the challenge of sustainable cities. The Federation of Canadian Municipalities supports municipal cooperation at the international level and has designed programs that promote municipal management and government. Canadian efforts have been particularly successful in strengthening environmentally sound decision-making and policy development in the area of municipal management. Canadians have also taken the lead in efforts of the International Council for Local Environmental Initiatives (ICLEI), which is based in Toronto.

As a specific example, the FCM China "Open Cities" project provided training programs and courses in China on urban management and economic development. As a result of the training, many participants in the project "moved on to influential positions, where their specialized expertise in sustainable development has prevented mistakes, upgraded practices, and made the environment a factor in the decisions reached in the offices of various departments and authorities.[24]

Municipal partnerships have also addressed environmental concerns such as water sanitation and waste management. The city of Goulbourn, Ontario's experience proved relevant to the problem of spreading urbanization in Tagaytay, Philippines. Goulbourn is cooperating on waste management and urban planning for the popular tourist spot.

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[23] *Global Action Plan: The Habitat Agenda.* June 1996.

[24] FCM materials, p. 13.

6. KEY ISSUES FOR WORKSHOP CONSIDERATION

- How can seamless linkages between public and private sectors, so that both aspects of urban client needs -- typically in a municipal government -- can be addressed;

- How can connections between "demand" and "supply" sides of urban infrastructure and buildings, so that financially viable systems can be designed and implemented;

- How can Canadian interests combine their marketing of multiple products and services together, for integrated sales and project development, at lower overhead for each participant?

- What steps are needed to achieve on a regular basis combined design, implementation and financing for Build-Own-Operate projects desired by urban centres privatizing collective urban services;

- How can Canadian teams find appropriate combinations of linguistic, cultural, technical and social skills and talents to interact with clients over the long periods associated with major urban projects?

- How can our public and private sector bodies forge close linkages between innovation and application to assure sophisticated and demanding urban markets and clients that they are receiving the most advanced and also reliable solutions?

ANNEX "A": FORECAST OF GLOBAL URBAN GROWTH

THE WORLD'S URBAN POPULATION 1995-2010*
(BY REGION)

REGIONS	% OF TOTAL 1995	% OF TOTAL 2010	AVERAGE ANNUAL % INCREASE 1995 TO 2010
AFRICA	34.7	53.9	4.4
ASIA	34.0	50.1	3.1
CENTRAL AMERICA	68.3	82.3	2.4
SOUTH AMERICA	78.0	90.0	1.8
OCEANIA	70.9	78.8	1.6
NORTH AMERICA	76.4	85.0	1.5
EUROPE	75.0	82.2	0.7
WORLD	45.2	59.2	2.5

* *World Resources Institute 1994-95 Data Base Diskettes*

COUNTRY URBAN POPULATION 1995-2010*
(TOP 25)

COUNTRY	% OF TOTAL 1995	% OF TOTAL 2010	AVERAGE ANNUAL % INCREASE 1995 - 2010
1. OMAN	13.2	21.7	7.0
2. BHUTAN	6.4	11.4	6.4
3. BURKINA FASO	19.5	33.5	6.4
4. SOLOMON ISLANDS	17.2	26.7	6.1
5. BURUNDI	6.1	9.8	6.0
6. NEPAL	13.7	23.2	5.9
7. NIGER	23.1	34.4	5.9
8. RWANDA	6.1	8.9	5.9
9. TANZANIA	24.4	36.3	5.9
10. MALAWI	13.5	21.0	5.7
11. ETHIOPIA	13.4	19.5	5.6
12. KENYA	27.7	39.7	5.6
13. MADAGASCAR	27.1	38.6	5.6
14. MOZAMBIQUE	34.3	50.5	5.6
15. UGANDA	12.5	18.8	5.6
16. YEMEN	33.6	47.4	5.6
17. BOTSWANA	30.8	46.9	5.5
18. COMOROS	30.8	41.8	5.5
19. MALI	27.0	38.1	5.4
20. ANGOLA	32.2	44.2	5.3
21. GUINEA	29.6	41.6	5.3
22. LAOS	21.7	32.6	5.3
23. LESOTHO	23.1	35.3	5.3
24. BANGLADESH	19.5	30.3	5.2
25. SWAZILAND	31.2	45.4	5.2

* *World Resources Institute 1994-95 Data Base Diskettes*

TOTAL URBAN POPULATION GROWTH BY INCREMENTS (TOP 25 COUNTRIES IN MILLIONS)

	COUNTRY	1995*	2010**	INCREMENT OF URBAN GROWTH
1.	CHINA	362.5	601.2	238.7
2.	INDIA	249.1	408.4	159.3
3.	INDONESIA	62.8	118.3	55.5
4.	UNITED STATES	200.5	246.4	45.9
5.	PAKISTAN	44.7	88.2	43.5
6.	BRAZIL	125.3	168.4	43.1
7.	NIGERIA	43.7	81.2	37.5
8.	MEXICO	69.1	106.4	37.3
9.	TURKEY	42.0	66.3	24.3
10.	BANGLADESH	23.4	47.7	24.3
11.	RUSSIAN FEDERATION	100.9	123.7	22.8
12.	PHILIPPINES	31.4	53.7	22.3
13.	EGYPT	25.9	42.0	16.1
14.	REPUBLIC OF KOREA	34.8	49.8	15.0
15.	JAPAN	97.5	111.4	13.9
16.	SOUTH AFRICA	21.0	31.7	10.7
17.	THAILAND	14.8	25.5	10.7
18.	UKRAINE	35.1	44.2	9.1
19.	FRANCE	42.3	50.0	7.7
20.	ETHIOPIA	7.6	14.8	7.2
21.	SPAIN	31.6	38.6	7.0
22.	ITALY	40.3	46.4	6.1
23.	GERMANY	70.7	76.6	5.9
24.	POLAND	24.7	29.5	4.8
25.	UNITED KINGDOM	52.4	55.9	3.5

* *World Resources Institute 1994-95 Data Base Diskettes*

** The World Bank, *World Development Report, 1997*

ANNEX "B" EXAMPLES OF CURRENT WORLD BANK INVESTMENT PROJECTS RELATING TO SUSTAINABLE URBAN DEVELOPMENT

COUNTRY	PROJECT NAME	FIRST YEAR	BANK ($m)	TOTAL COST
1. CHINA	Tianjin Urban Development and Environment	1992	100	195
2. INDIA	Alternate Energy	1993	26	186
3. INDONESIA	Solar Home Systems	1997	20	112
	Renewable Energy Small Power Project	1997	66	141
	Suryaba Urban Development	1994	175	618
4. KOREA	Kwangju and Seoul Sewerage	1993	110	530
5. BRAZIL	Water Quality and Pollution Control-Sao Paulo/Parana	1993	245	494
6. CHILE	Environment Institutions Development	1993	12	33
	Second Valparaiso Water Supply and Sewerage	1991	50	142
7. TUNISIA	Solar Water Heating	1995	4	21
8. RUSSIA	Environmental Management	1995	110	195
	New Housing Construction	1995	400	756
	Apartment Renovation	1995	300	500
9. BURKINA FASO	Urban Environment	1994	37	40
10. THAILAND	Promotion of Electricity Energy Efficiency	1993	10	89

ANNEX "C" PROFILE OF RELEVANT CANADIAN TECHNOLOGICAL STRENGTHS

Environmental Industries

Approximately 4500 Canadian firms are active in the environmental industry. These firms earned about $11 billion in 1994, of which $6 billion came from the sale of manufactured goods such as membranes for water treatment, heat exchangers, ventilations systems, recycling equipment, alternative fuel vehicle components and hydro turbines. About $5 billion came from the sale of services such as consulting and environmental engineering, as well as a wide range of scientific clean-up, geomatics, remote sensing, waste management, laboratory testing and general research.

Clients and joint-venture partners around the world are looking to Canadian companies to provide the needed expertise for a wide range of environmental undertakings, whether they involve soil, water or air. More than 800 of Canada's environmental companies are active exporters, and Canada is a world leader in environmental services, biotechnology, remediation, monitoring and instrumentation.

Wastewater management

Canadian industrial wastewater management firms, associated research and development centres, and universities have developed expertise and technical solutions for complex municipal and industrial water and wastewater treatment requirements.

Air quality management

The majority of air quality management equipment manufactured by Canadian companies can be grouped into four categories: filters, extractors, specialized scrubber components and precipitators. Canadian companies have expertise in managing sulphuric emissions and the effects of acid rain, as well as in advanced industrial filtering systems.

Canadian air-quality management firms have developed innovative, cost-effective solutions in emerging sectors, including:

- continuous emissions monitoring with process controls
- biofiltration
- clean incineration technologies
- hot-gas cleaning using advanced particle filters
- indoor and ambient air technologies

Solid waste management

Currently 80 percent of municipal and industrial solid waste in Canada is disposed of by landfilling. The remainder is disposed of through recycling, resource recovery and incineration. More stringent regulations in many countries have made solid waste management one of the fastest-growing sectors of Canada's environmental industry. While the emphasis to date of Canadian companies has been on the North American marketplace, Canadian solid waste equipment and services are shipped worldwide.

Canadian expertise in solid waste management includes:

- composting and recycling technologies
- material recovery facilities
- incineration
- waste-management planning
- sludge management
- soil remediation
- landfill and liner design
- hazardous waste disposal.

Renewable Energy Technologies

Canada's expertise in renewable energy technologies is also starting to become an import export industry. A number of organizations and activities support the international commercialization of these technologies including: Solar Energy Society of Canada Inc., the Canadian Wind Energy Association, the Canadian Solar Industries Association, the International Energy Agency, Photovoltaic Power Systems (PVPS) Implementing Agreement, and Natural Resources Canada's three programmes; PV for the North, Renewables for Remote Communities, and Renewable Energy Technologies Development Program.

Canada's research and development program emphasizes technologies that will be commercially viable over the next two to five years. R&D activities have focused on solar energy, photovoltaic modules for building materials, solar thermal, wind energy, microhydro energy, bio-energy, and wave energy.

Urban and Regional Planning, Architecture and Engineering Services

Canada has world-class engineering, architectural and construction contracting capabilities. Services in which Canadians excel include urban community planning, ranging from remote arctic settlements in Siberia to large Asian cities; land assembly; site design and servicing and environmental analysis.

Canadian-owned companies such as John van Nostrand Associates Limited (JVA) have experience in not only metropolitan planning and design, but also, in the detailed design and construction which must ultimately complement any planning program in order for it to become a reality. JVA has established a reputation for producing studies and projects which are practical and implementable. The company works overseas in association with local consulting firms and engages local residents who bring their understanding of local conditions to the benefit of projects.[25]

Commissioned by the Dalian Municipality, Vancouver-based Bing Thom Architects is designing a new city centre -- virtually the same as Vancouver's downtown peninsula. What makes this scheme noteworthy and special compared with other large-scale developments in China is its sensitivity to site conditions. Mr. Thom, the principal, believes that "the best way to design and plan is to start from nature, to understand and to learn from nature." Based on this philosophy, actually a teaching found in ancient Chinese architecture, this scheme incorporates the concerns of the environment, socio-cultural impact, and economic viability. The scheme has already impressed the people and the mayor of Dalian.

The new city will eventually house a million people and cost more than $700 billion. Residents will live, work and rest in areas scaled to humans. Mixed-use development, well-proportioned city blocks and a street scale that allow for a variety of uses are key aspects of the city's design.

The World Bank's Yangtze Urban Environment Strategy Study involves a re-assessment of the whole urban environment sector in the Yangtze river basin in order to recommend an integrated approach to future urban environmental investment, management and planning. Objectives of the study include: define demand for urban environmental infrastructure and environmental management services in cities of the Yangtze river basin over the next decade; identify and define strategic objectives for the urban environment sector in the Basin; identify policy options for the Basin's urban environmental sector and recommend the most appropriate set of policies, including priorities and responsibilities for implementation; and finally, propose an urban environment investment framework to guide continued World Bank and Government of China collaboration in this sector in the Basin over the next ten years.

Chreod is a multi-disciplinary consulting firm of urban and regional planners, economists, management consultants, and environmental managers established in Canada in 1985. Since starting work in China in 1988, the firm has completed 25 person-years of consulting and research assignments in nine provinces and in Shanghai, Beijing and Tianjin; over 90% of Chreod's workload for the past three years has been in China.

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[25] *Presentations Report: Tuesday in the City*, Canadian International Development Agency, August 1997.

Chreod provides two streams of services in China: regional and urban management, largely for governmental and international development agency clients; and capital projects development, for both multilateral lenders and foreign investors.

Rail and Urban Transit, Expressways

In 1995, the rail and urban transit sector of Canada's transportation industry shipped approximately $2.5 billion worth of goods, of which more than 70 per cent was destined for foreign countries. The US market is Canada's top customer, but countries in Asia and Latin America have shown an increasing interest in Canadian capabilities. Canadian sales to non-U.S. markets have increased significantly since 1993, particularly through design, engineering and construction of ready-to-operate transit systems. Canadian companies have the proven technologies, expertise, new products and operational efficiencies to expand their markets.

Some major products offered by the Canadian industry include:

- Rail rolling stock: passenger and freight
- Turn-key passenger rail systems
- Buses: large transit buses; low-floor and alternate-fuelled buses; intercity coaches and school buses
- Diesel locomotives: D-C and A-C traction
- Signalling and communication systems
- Advanced train-control systems
- Specialized software for transit scheduling, operations and public information
- Consulting services such as the development and implementation of management information systems

A show piece urban transit system is underway in Malaysia through a number of Canadian-owned companies. Phase I of a new rapid transit system linking the western and eastern suburbs of Kuala Lumpur, Malaysia with its city core is scheduled to be operational for the Commonwealth Games in 1998. The system is expected to provide an initial capacity of 10,000 passengers per hour per direction. As the need arises, the system is designed to accommodate up to 30,000 passengers. City officials hope to improve the city's air quality as the number of polluting vehicles continues to congest. The system is owned and operated by Projek Usahasama Transit Ringan Automatik Sdn Bhd (PUTRA), wholly-owned subsidiary of Renong Berhad.

The Bombardier Consortium, in association with the Vancouver SkyTrain transit system operator, BC Transit, is supplying all of the electrical and mechanical equipment, vehicles, and services related to the implementation of the Advanced Rapid Transit (ART) MK II technology. The Consortium consists of the internationally recognized firms, Bombardier Inc. and SNC-Lavalin.

Bombardier has completed manufacture of 70 ART MK II vehicles to provide service for 24 stations on a mostly elevated dual-lane guideway. Bombardier is also providing training for all PUTRA's O&M staff, as well as operations and maintenance advisory support during revenue service.

SNC-Lavalin's Malaysian subsidiary was also awarded the contract for construction of a cut and cover transit model. As well, SNC-Lavalin is working in joint venture on the design/build of two underground stations. The project required a 482 metre cut and cover tunnel adjacent to the famous Central Market in Kuala Lumpur.

Energy- and Water-Efficient buildings

According to the Organization for Economic Co-operation and Development (OECD), Canadians are among the best housed people in the world. Weather conditions varying from harsh dry winters to hot humid summers have forced Canadian scientists to take the lead in developing technologies in air control, heat and moisture flow, durability, and fire safety.

The Canadian housing industry plays a significant role in Canada's export profile. Housing industry and housing-related exports add up to approximately $14.5 billion annually. The Canadian housing industry exports high quality products, services and systems that can provide low-cost, energy-efficient housing for the growing world wide demand. Canadian housing products incorporate world-class building technology, exemplified by the Canadian-developed R 2000 standard, which ensures that products provide maximum energy conservation and optimal internal air quality and comfort. Canadians are also part of the small but fast growing international expertise in reducing the impact of construction on the environment over a building's lifetime.

With a wealth of experience in cold climates, Canada is a recognized leader in the development of heating system technologies and in applying thermal energy conservation techniques in housing. Canada's leading-edge heat recovery ventilators and air-exchange technology reflect the high priority the Canadian industry places on air quality. A proven breakthrough technology in air flow, temperature and moisture control is the seamless housewrap sheathing membrane, developed in Canada.

Opportunities exist for Canadian-style materials and practices and for low rise construction, including wood-based or other forms of manufactured housing in the following areas:

- housing for emerging middle classes, technical specialists and middle level professionals or administrators; much of this may be apartments, but can also include row-housing and other lower-density units;

- large-scale social housing projects, spearheaded by national government agencies with international support and financial assistance; and

- improved existing housing, including rehabilitation of substandard housing with better insulation, internal plumbing and water supply, and retrofitting and improving housing that may be adequate, but where newer functional or aesthetic elements will be added as income levels rise.

Canadian expertise is showcased through non-governmental organizations such as the Rooftops Canada Foundation. Founded in 1984 as the international program of the Cooperative Housing Federation, Rooftops consists of cooperative and social housing organizations in Canada. It is recognized nationally and internationally as the primary Canadian non-governmental group focused on international housing and human settlements issues. Rooftops works with the broad social housing sector in Canada to improve housing conditions, build sustainable communities and develop shared understanding. The main focus is on disadvantaged communities in the South and to some extent on countries in transition.

Problems encountered are those surrounding the present housing industry in many major markets: limited use of faster, less expensive frame-based systems; complex materials distribution systems; productivity problems with local workers; and financing problems of potential customers. Affordability of imported housing is one of the main concerns of exporters. Canadian companies worked on reducing prices by improving productivity, distribution routes, construction systems and construction management, and business efficiency generally. The main theme for customer service is supplying good quality housing at an affordable price. Procurement methods such as the formation of networks, more cooperation, the use of distribution bases, and franchise chain development helped to increase the efficiency of the distribution system.

Wherever possible, Canadian companies could seek to distinguish their products and services from those of U.S. competitors, focusing on superior energy efficiency, quality and price. Canadian companies are working to promote wood-frame and Canadian-style housing, adapted on a continuous-improvement basis to local needs and conditions. They are also developing joint ventures to ship from Canadian factories and assemble with local contractors as dominant partners. In addition, they could move to strengthen further technical and quality-control cooperation.

ANNEX "D": SUSTAINABLE CITIES BIBLIOGRAPHY

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